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Analysing the performance of leading Conversational AI Companies in Countries Based on Open Datasets

Master's Thesis by the 2nd year student Concentration — Master in Management
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АННОТАЦИЯ

Автор	Нутеш Кумар
Название магистерской диссертации	Анализ деятельности ведущих компаний, работающих в области разговорного искусственного интеллекта, на основе открытых данных
Факультет	Высшая Школа Менеджмента
Направление подготовки	38.04.02 “Менеджмент” (Профиль: Международный Менеджмент)
Год	2020
Научный руководитель	Гаврилова Татьяна Альбертовна, д.т.н., профессор
Описание цели, задач и основных результатов	Основная цель этого исследования состояла в том, чтобы оценить, существуют ли явные различия в том, как разговорный ИИ влияет на бизнес и как разные страны продвигают усилия в области ИИ. Основными вопросами исследования были следующие: • Какие страны с ИИ наиболее развиты? Какова их политика и подходы к государственному регулированию разговорного ИИ? • Каковы наиболее представительные компании, занимающиеся технологиями разговорного ИИ, согласно наборам открытых данных? Каковы результаты анализа деятельности ведущих компаний? • Каковы типичные инвесторы ведущих компаний Conversational AI в Индии (какой тип инвестора и на каком этапе финансирования)? Основываясь на результатах исследования, мы можем сказать, что есть явные признаки того, что разговорный ИИ положительно влияет на бизнес в ведущих странах. Разговорный ИИ не только поддерживает предприятия, но и расширяет их бизнес-процессы. Несколько стран продвигают усилия по искусственному интеллекту с помощью своей политики, правил и стандартов.
Ключевые слова	Искусственный интеллект, разговорный ИИ, обработка естественного языка, цифровизация, цифровые технологии, Индия

Abstract

Master Student's Name	Nutesh Kumar
Master Thesis Title	Analysing the performance of leading conversational AI companies in countries based on open datasets
Faculty	Graduate School of Management
Main field of study	38.04.02 “Management” (specialization: International Management)
Year	2020
Academic Advisor’s Name	Tatiana Gavrilova, Doctor of Science Degree in Computer Science, Professor
Description of the goal, task and main results	The main goal of this study was to assess whether there were clear differences in how Conversational AI is impacting the businesses and how different countries are promoting AI efforts. The main research question were following: • What are the most developed AI countries? What are their policies and approaches to state regulation of Conversational AI? • What are the most representative Conversational AI Tech companies, according to the Open datasets? What are the analysis of performance of leading companies? • What are typical investors of Conversational AI leading companies in India (which type of investor and on what stage of funding)? Based on the result of the research we can say that there is clear indication that conversational AI is impacting the business positively in leading countries. Conversational AI not only supports the businesses but has upscale their business processes. Several countries are promoting AI efforts through their policies, regulations and standards.
Keywords	Artificial intelligence, conversational AI, Natural Language Processing, digitalization, digital technologies, India

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CONTENTS

INTRODUCTION

Artificial Intelligence (AI) is a concept that for decades has been part of public discourses, often featured in science fiction films or debates on how intelligent machines will take the world placing the human race in a life of slavery in support of a new AI order. Although this image is a specific AI image, the reality is that artificial intelligence has arrived now and many of us are constantly in touch with technology in our daily lives. AI technology is no longer the field of future scientists but an integral part of the multi-agency business model and an important strategic element in the plans of many business, medical and government sectors around the world. This transformational impact from AI has led to greater interest in education with the latest research examining the effects and effects of technology than the effects of AI performance, which seems to be an important research center for some years.

Conversational Artificial Intelligence (CAI) systems and intelligent assistants (IA), such as Alexa, Cortana, Google Home and Siri are becoming ubiquitous in our lives, including those of children, their impact of gaining more attention, especially in relation to the effects of these programs on children's mental development, socialization and language. Recent developments address CAI's implications for privacy, security, safety, and accessibility. However, there is a need for connecting and embedding ethical and technical aspects in design and development. Using a case-study of a research and development project focused on the use of CAI in leading countries, this research work highlights the social context within a particular case of technological development, as evidenced and supported by contradictions within the literature. It describes the decision-making process behind the recommendations made in this case for adoption in the industry. Further research involving developers and stakeholders in CAI behaviour are highlighted as a matter of urgency.

Russell and Norvig (2016) defined the term AI to describe systems that mimic cognitive functions generally associated with human attributes such as learning, speech and problem solving.

The motivation for this study is twofold as it is based on an increase in publications on Artificial intelligence and the importance of investment in AI for global economy (Maria Cubric, 2020). Companies around the world have tried to implement artificial intelligence techniques adopted by different country strategies.

The success of AI depends on its correct execution. To ensure AI success, organizations often need to excel in a wide variety of applications, including creating strategies, finding the right use cases, building a database, and developing strong experimental capabilities. These capabilities are critical at this time because the window to differentiate oneself from competitors is likely to narrow as AI becomes easier to use.

Early users from different countries show different levels of AI maturity. The enthusiasm and experience of early adopters varies from country to country. While some are actively using AI, others are taking a more cautious approach. In some cases, subscribers use AI to improve certain processes and products; others are using artificial intelligence to transform their entire organization.

No matter how mature AI is in countries, we can learn from its approach. By looking at country problems and how to solve them, we can collect some key innovative practices. For example, leaders in some countries are more concerned with filling skills gaps. Others focus on how AI can improve decision-making or cybersecurity capabilities.

There are many paths to great AI, and success doesn't mean that the winner takes it all. Looking at early AI users from a holistic perspective can provide a broader perspective. By doing this, anyone can find a more balanced AI-based approach to their journey.

The main goal of the study is to explore whether there were clear differences in how Conversational AI is impacting their businesses and how different countries are promoting AI efforts. In order to achieve the goal, we focussed the research on following questions:

RQ1. What are the most developed AI countries? What are their policies and approaches to state regulation of Conversational AI?

RQ2. What are the most representative Conversational AI Tech companies, according to the Open datasets? What are the analysis of performance of leading companies??

RQ3. What are typical investors of Conversational AI leading companies in India (which type of investor and on what stage of funding)?

The research is based on number of common methods with different level of implication - Theoretical

The work structure consists of several parts:

- Introduction: background and motivation for the thesis development, general description of the problem, research questions, structure and volume of the work;
- Chapter 1: literature review with the most relevant information related to the analyzed main topics: conversational AI, Chatbots and voice assistants, connection links between these topics;
- Chapter 2: general description of the potential research methods, followed by explanation for the chosen research strategy;
- Chapter 3: Findings and discussion.
- Conclusion: summarization of the results of the work performed and evaluating the results obtained.

CHAPTER 1. UNDERSTANDING OF CONVERSATIONAL AI

1.1 The concept of conversational AI

Artificial Intelligence (AI) is a concept that for decades has been part of public discourses, often featured in science fiction films or debates on how intelligent machines will take over the world puts the human race in a normal life to support the new AI system. Although this image is a specific AI image, the reality is that artificial intelligence has arrived now and many of us are constantly in touch with technology in our daily lives. AI technology is no longer the field of future scientists but an integral part of the multi-agency business model and an important strategic element in the plans of many business, medical and government sectors around the world. This transformational impact from AI has led to greater interest in education with the latest research examining the effects and effects of technology than the effects of AI performance, which seems to be an important research center for some years(yogesh et al;Laurie et al, 2021).

In this digital era, artificial intelligence (AI) is expected to take on tasks (Letheren et al., 2020), especially on text-based chat agents (chatbots). Chatbots dramatically change customer service function for the betterment of users and businesses (Cath et al., 2018; Wirtz et al., 2018). Currently, chatbots offer 24/7 services in a number of areas, such as marketing, support, and marketing. Specifically, chatbots are widely used to do sales work (41%), followed by support (37%), and marketing (17%). Most importantly, it improved sales by an average of 67%, with 26% of all sales being managed by chatbots communications(ashfaq et al; jiang et al; Sandra et al, 2020). Conversation channels are automated systems used to communicate with people in writing or through exchange (Przegalinska et al., 2019; Radziwill & Benton, 2017; Sivaramakrishnan et al., 2007).

Conversational AI (CAI) communication agents are found everywhere in the lives of adults and children in the developed world. Intelligent Personal Assistants (IPA) such as Cortana (Microsoft), Alexa (Amazon), Siri (Apple), and Google Assistant are probably the most well-known CAI methods and are at the forefront of technological advances. CAI has been very successful due to advances in automated speech recognition (ASR) (Karpagavalli & Chandra, 2016), Indigenous Language Processing (NLP) (Trilla, 2009; Vanzo, Bastianelli, & Lemon, 2019), and In-Depth Learning (DL) models. (Abdel-Hamid, Mohamed, Jiang, Deng, Penn, & Yu, 2014). The rapid evolution of Artificial Intelligence (AI) has led to the common use of CAI systems that work well in everyday tasks. CAI software enables people to communicate with many different programs in natural language through voice, text and video(Jennifer et al; sondess et al, 2021).

Automatic speech recognition is an important factor in CAI that has a direct impact on interoperability quality. ASR is the process of translating user-spoken words into text. The performance of an ASR system depends largely on the strength of its components, however, its ability to effectively manage variability in audio signals plays an important condition. ASR deals

with several sources of acoustic diversity (Yu & Deng, 2016), resulting in complex interactions with speaker features. These can be categorised as: firstly, within speaker variables, these concern momentary and longitudinal variations in the voice due to emotional expression and arousal (Lee, et al., 2004), illness, age (Morris & Brown, 1994; Vipperla, Renals, & Frankel, 2010), body mass (de Souza & dos Santos, 2018) etc. All of these factors need to be considered by the acoustic model to represent all potential speakers in all states. Secondly, between speaker variables (i.e. variations in spoken language, vocal tone and speech style) which mainly concern different accents, non-native accents, dialects, slang, speech impairment and disorders, gender (Morris & Brown, 1994; Swartz, 1992) and even race (Xue & Fucci, 2000).

Users interact with these programs to obtain a product or service related information, place an online order of products, or order food in real time (Sivaramakrishnan et al., 2007; Luo et al., 2019). Such systems are used to make it easier for both end users and companies, due to their accessibility, flexibility, and low cost (Przegalinska et al., 2019; Radziwill & Benton, 2017). For this reason, about 80% of businesses today use or plan to install chatbots soon to communicate with their users 24/7 and resolve their problems(ashfaq et al; jiang et al; Sandra et al, 2020).

Chatbots use natural language to interact with users and answers their queries effectively (Ciechanowski et al., 2019; Luo et al., 2019; Sivaramakrishnan et al., 2007). If chatbots are wellsystematized, their use can produce excellent results, such as resource and time savings (PointSource, 2018).

1.2 Chatbots & Voice Assistants

Chatbots are mainly text-based conversational agents that simulate conversations with users.In this digital era, artificial intelligence (AI) is expected to take over jobs (Letheren et al., 2020), especially for text-based conversational agents (chatbots). Chatbots dramatically change customer service function for the betterment of users and businesses (Cath et al., 2018; Wirtz et al., 2018). Currently, chatbots offer 24/7 services in a number of areas, such as sales, support, and marketing. Specifically, chatbots are widely used to do sales work (41%), followed by support (37%), and marketing (17%).Most importantly, it improved sales by an average of 67%, with 26% of all sales being managed by chatbots communications (ashfaq et al; jiang et al; Sandra et al, 2020).

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Chatbots use natural language to communicate with users and answer their questions effectively (Ciechanowski et al., 2019; Luo et al., 2019; Sivaramakrishnan et al., 2007). According to a recent report released by PointSource, chatbots will face 85% of customer service by 2020, which will help reduce annual costs by more than $ 8 billion by 2022 (PointSource, 2018). When chatbots are

well organized, their use can produce even better results, such as resource conservation and time saving (PointSource, 2018).

With the growth of human interaction and chat in recent years, users are now able to communicate with chatbots using a variety of devices — smartphones, laptops, tablets, or desktops (Araujo, 2018; Luo et al., 2019). Many forums, including Facebook, Skype, Amazon, WeChat, and eBay have already released e-service chatbots (Luo et al., 2019). In addition to the e-service chatbot and the effort to host a chatbot craze, Domino now offers a pizza online chatbot order via Facebook Messenger (Luo et al., 2019). These digital assistants serve as the company's representative whose goal is to assist online shoppers at any time anywhere (Chung et al., 2018; Holzwarth et al., 2006). For example, consumers can expect to have the same interactions with people as an offline store when visiting an online forum (Sivaramakrishnan et al., 2007). Therefore, these automated programs not only provide information to consumers but also communicate with them as a personal assistant; one such example is Coca-Cola's "Hank" (Sivaramakrishnan et al., 2007). Many of the top leading players, such as Gucci, Burberry, and Louis Vuitton, also use chatbots to provide 24-hour customer service (Chung et al., 2018). E-service interviews offer a completely new way to satisfy users (Chung et al., 2018) because such programs "fulfil many roles, from personal assistant, to a smart agent, to a friend" (Radziwill & Benton, 2017, p. 4) .Visual agents can be used to provide uninterrupted customer service and reduce response time, factors that are important in improving customer satisfaction (Radziwill & Benton, 2017).

Despite the widespread use of chatbots by a few business leaders in recent years, consumer acceptance and its continued use remain relatively low. For example, a recent study found that 87% of consumers still prefer social interaction rather than chatbots (ashfaq et al; jiang et al; Sandra et al, 2020). Respondents agreed that people are much better than chatbots in answering a few questions, especially in their understanding of complex situations — in other words, they feel that agents are people who understand better (ashfaq et al; jiang et al; Sandra et al, 2020). Recent research also shows that customers feel uncomfortable when they do not believe they are in contact with someone because they think chatbots are less knowledgeable and less sensitive; therefore, they make a small purchase (Luo et al., 2019).

AI chatbots not only provide customers immediate and consistent services but also reduce the operating costs for organizations (Deloitte, 2018a; Wirtz et al., 2018). Previous studies already show that, in traditional service, the service quality of frontline employees who directly contact customers will significantly affect customer satisfaction, customer loyalty, and organization profits (Arora & Narula, 2018; Cenfetelli et al., 2008; Maklan et al., 2017). For example, Juniper Research predicts that the use of chatbot could save companies $ 7.3 billion by 2023 (Juniper Research, 2021). Some predict the number of e-commerce jobs supported by chatbots reaching $ 112 billion by 2023, and the global market size of chatbots reaching $ 1.3 billion by 2025 (Dilmegani, 2021). According to a recent report, 58% of companies using chatbots are B2B, and 22% are B2C (Boomtown, 2019). Chatbots are increasingly used in B2B marketing business operations. Chatbots can enhance B2B marketing in a variety of ways, such as facilitating the marketing process, creating more traffic from emails, and providing more efficient customer service (Johnston, 2020). For example, chatbots can provide answers to frequently asked questions by

customers, wishing quick and helpful answers. Therefore, chatbots are now playing an increasingly important role in improving customer service in B2B advertising

Chatbots are evolving to simplify and make access to digital services personal (Go & Sundar, 2019). Designed to engage people in person-to-person conversations (Araujo, 2018; Scarpellini & Lim, 2020) accompanies people in their daily lives as "digital trainers" (Fleisch, Franz, & Herrmann, 2021) or "virtual assistants" (Youn & Jin, 2021) provides users with individual, “high-impact” support (Wünderlich, von Wangenheim, & Bitner, 2012) on their smartphones or other devices, anywhere and anytime (Skjuve & Brandtzæg, 2018). The main motivations for users to interact with chat agents are many, which are reflected in the variety of conversational agents available from reputable voice assistants of the common purpose SIRI (Apple, Inc.) or ALEXA (Amazon, Inc.)

Artificially intelligent (AI) voice assistants (VAs), such as Amazon’s Echo (Alexa), Apple’s Siri, Microsoft’s Cortana, and Google’s Google Assistant, are instrumental in changing the way consumers use firms to seek service assistance, obtain information, and purchase products (Hoy, 2018; Guzman, 2019). Recent research illustrates that 20% of the US adults has access to VAs (Robbio, 2018). Gartner (2016) predicts that VAs will replace PCs, laptops, tablets, and cell phones in many online shopping items, while Accenture (2018) states that 3 out of 10 consumers talk to their VA over their family. In line with this, Juniper Research proposes that VAs, such as the Amazon Echo and Google Assistant, will serve as a key driver of new service items with an estimated 275 million homes expected to use such assistants by 2023; 1000% growth from 25 million homes by 2018 (juniper research 2018). Thus, in view of the proliferation of AI-supported voice technology, individuals interact with virtual reality VAs as part of their daily lives (Guzman, 2019). Therefore, understanding voice-based AI interaction is a timely and important area for research as products enter this technology space as a service delivery center.

Hoy (2018) describes VAs as software agents working with a built-in speaker or smartphone device. The software always listens to the keyword to activate it (i.e., ‘Hey Alexa…’ or ‘Hey Siri…’). When it hears a keyword, the device uses the voice of the user, interprets the language, and processes the response in real time. Such VAs can handle complex user requests and engage in individual conversations (Alepis & Patsakis, 2017). Undoubtedly, the introduction of AI VAs on mobile devices such as Apple's Siri was the first application to make consumer-focused AI interactions a reality (Gross, 2011). Due to the ubiquitous smartphone, people can interact with AI technology in different ways in their interaction with all other technologies (Guzman, 2019) Unlike previous attempts at automated voice interaction, new mobile and home VAs use natural language processing (NLP) that enables people to communicate, and access responses, technology in the same way as human interaction (Hearst, 2011). Not only have these VAs developed to be more human-like than previous attempts, but also a vital part of a people’s daily life.

Voice assistants can work for a variety of user groups ranging from minors, adults, and people with different disabilities (e.g. the Google Android app "Voice Access" allows people with disabilities to navigate using the voice to press buttons), and allows users to use voice commands, even if multiple tasks are performed during the interaction (McLean & Osei-Frimpong, 2019). Current data shows the acquisition of smart voice assistants is modest compared to smart phones

(Kinsella, 2018). Other research on the U.S. market has shown that millennials (18–24 years old) are key users of products such as smart virtual assistants; however, a slightly older age group (aged 25-49) are heavy users of products like Siri (PwC, 2018). Some studies have found intelligent voice assistants have only been used primarily for basic tasks, browsing, and listening to music. The high-level architecture of CAI (see, Fig. a), as it is important to understand the potential role of each of them on the direct interaction between people and the voice assistant.

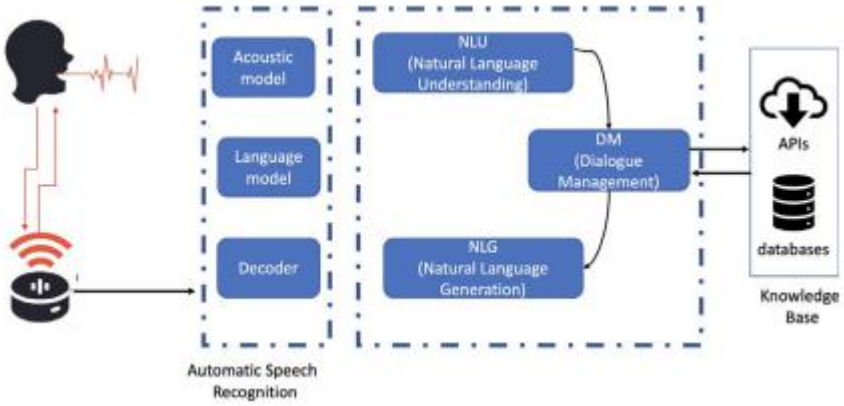

Fig. a. A high level architecture for voice assistants (Jennifer et al; sondess et al, 2021).

1.3 Literature Review

1.3.1 the first AI standards

As technology advances rapidly, there appears to be a race among major countries to articulate standards for artificial intelligence. Obviously, it's about fostering innovation. But beyond innovation, there is also an ethical problem with AI that governments expect to address with specific regulations. Artificial intelligence relies on huge datasets of individual users (kamil et al; Piotr et al, 2021), and there is a lot of debate about who owns this information and how that information is used to further manage AI applications and related services.

It is therefore necessary to coordinate the efforts of all stakeholders, both private and public. Globally governments are trying to implement specific systems and strategies for building AI algorithms and collecting data throughout the process. Developing standards that improve the quality of AI products and services can also reduce the risk that the public will react negatively to this technology. If India is to catch up with China, the United States and other countries in AI, it will have to invest significant sums of money to build the necessary technological ecosystem and articulate norms and ethical standards for AI (vishal et al 2019).

It is important to clarify the difference between law, order and standard. The rules and regulations are set by a group of people, setting management limits or making recommendations. Today standards are as important as in the digital age, distributed systems must work together; data and information (Knowledge) should be exchanged in a secure, reliable, secure and accurate manner.

Standards provide benefits in the research, development and operational stages as well as market flexibility and flexibility of components, or to connect different SW modules in a reliable way through standard agreements. Additionally, common standards and regulations will be necessary to ensure the safety and trust of users. The development of standards can provide business advantages for the company or country dominant in international standardization process (Ding, 2018).

Some examples of AI Standards:

There are several related safety standards (GDPR), Cobot security (ISO / TS 15066) - which can be used in the development of reliable AI systems. Problems arise if there is super intelligence, in the event of a machine behaviour, as today it is difficult to predict / measure behaviour of these systems, so it is difficult to formulate specific rules, their regulations or standards. AI policies, government initiatives and strategies, technology organizations are grouped into publication (OECD, 2019) the same AI listing international and domestic standards. In the following some examples in AI related levels are listed as having been developed or are still being developed by various organizations:

• International rating agencies - e.g. ISO, IEC - 22 AI standards under development, 6 standards published by ISO / IEC JTC 1 / SC 42 - (ISO, 2021). Eg. - ISO / IEC TR 24028: 2020, Information technology - Artificial intelligence - Overview of loyalty to practical wisdom, 2020 May.

• Technology community, academics - e.g. IEEE IEEE launches Global Initiative on Ethics of Autonomous and Intelligent Systems project in AI general development (IEEE, 2020). IEEE P70xx - series common in the Ethics of Autonomous and Intelligent System levels - 13 levels slightly released or under development.

• EU-CEN and CENELEC-level institutions officially created the AI Focus Team, which supports ISO / IEC SC42 (December 2018).

US-based National Institute of Standards and Technology (NIST) has made the final draft plan to prioritise US federal participation in the development of standards for artificial intelligence (AI).

Here are the key objectives outlined in the framework:

- Bolster AI related information related to standards, leadership and communication between government agencies to enhance efficiency and effectiveness.
- Encourage in-depth research to develop and accelerate comprehensive testing and understanding of how loyalty factors can be incorporated within standards and tools related to standards.
- Support and expand independent public partnerships to develop and implement AI standards and related tools to promote reliable, robust and reliable AI.
- Strategically work with international organizations to improve AI standards for economic and security needs in the United States.

The framework states that AI standards developed in the coming years should be flexible enough to adapt to new technologies while also minimizing bias and protecting individual privacy. While some of the standards will apply to the broader AI market area, NIST has advised the government to assess whether certain applications require more specific standards and rules.

NIST Draft is a response to China's Comprehensive AI Policy.

The NIST framework of the US government was established in the Executive Order of February 13859 which went to the offices to further their interest in AI as international competitors such as China worked to support their AI capabilities. China has a very comprehensive AI policy framework, and the country released both guidelines and standards in July 2017 itself under the title The New Generation Artificial Intelligence Development Plan. This document covers the multi-billion dollar and investment policies of research and development from the houses of ministers, provincial governments and the private sector. Chinese government wants to build 1 trillion RMB ($ 140 billion) domestic AI industry

China Electronics standardization Institute (CESI), the largest research organization responsible for creating AI standards under the China Department of Industry and Information Technology (MIIT) has released the Artificial Intelligence standardization Whitepaper in 2018, summarizing the framework for the implementation of AI's China and China plans to create AI skills going forward.

CESI has established three working groups under the framework: one working group to create rules for setting AI standards, a second working group focusing exclusively on AI and open resource development, and third one on AI principles.

Part of CESI's Chinese AI standards have recently been finalized, as is the definition of the Chinese Speech Recognition Operating Systems. Additional levels are a work in progress and will be released soon. These standards are still distributed in various forms of testing and evaluation of AI platforms within the nation.

Where does India stand when it comes to AI standards?

India is not close to China in these areas due to the lack of control like China has over its people and organizations. Regulators here like the US are looking at a strong partnership between the private, public, non-profit and educational institutions, which will take time.

Taking a positive step in this regard, the state-sponsored think tank Niti Aayog identified many challenges in creating the right environment for AI renaming in its report entitled National AI Strategy. These include a lack of comprehensive information based on AI research and implementation, a lack of data environment - access to intelligent data, high cost of services and low awareness of AI acceptance, privacy and security, including a lack of legal rules regarding data anonymity and the lack of a collaborative approach to the adoption and implementation of AI.

NITI Aayog has adopted a three-dimensional approach - implementing POC AI pilot projects in various areas, formulating a draft national AI ecosystem policy that works in India, and meeting with various experts and partners. NITI Aayog has partnered with a few players to drive new AI to expand AI in key areas, such as agriculture and healthcare.

The think tank provided more than 30 policy proposals for incorporating resources into rational research, enabling regeneration and preparation, accelerating AI adoption over the value chain, and improving ethics, protection, and security in AI. Its main function is an integrated two-layer approach to propelling research into AI.

First ‘Center of research excellence’ in AI or CORE to focus on basic research. Second, CORE will serve as the providers of the innovative design of ‘International Centers for Transformational Artificial Intelligence’ or ICTAI, which will focus on making AI-based applications transparent in areas of national importance. It also proposes the establishment of 'Consortium of Ethics' councils at CORE and ICTAI, which will develop specific sector guidelines on privacy, security and ethics that will create a 'National AI market place' to increase market access and reduce data time and cost.

Why Do We Need AI Standards?

As technology advances rapidly, there seems to be a race among the big nations to make AI standards. This is obviously related to the development of composition. But, in addition to innovating, there is also the question of AI ethics, which governments expect to address with a certain amount of legislation. Performance intelligence is based on large data sets relating to individual users and there is a whole discussion of who owns the information, and how that information is used to further control AI-based applications and related services.

Therefore, there needs to be co-operation between all stakeholders, private and public. Global governments aim to set specific plans and strategies for how AI algorithms are created and how the day is collected throughout the process. Improving standards that improve the quality of AI products and services may also reduce the risk of technology backsliding. If India wishes to engage with China, the US and other countries in AI, it will have to invest heavily in establishing the necessary technical ecosystem and build a framework of ethics and standards in AI.

1.2.2 The AI Readiness indexes

Artificial intelligence (AI) will have a transformative impact on businesses. However, the greatest opportunities have yet to be seized. Companies that aim to implement AI in their business structures or provide AI services face a number of challenges when implementing AI in their businesses. As companies change and transform their business models and processes to take advantage of the benefits of AI, the bottleneck lies in the imagination, management, and most importantly, the implementation of the company’s business. ”. This thesis work aims to identify the range of dimensions and elements of a readiness model framework to help implement AI in business structures. The development of the model framework is based on conducting systematic reviews of the literature. Through this process, setup items can be assigned to setup dimensions (nortje et al;grobbelaar et al, 2020).

The 2020 Government AI Readiness Index.

Now in its third round, the Government AI Readiness Index ranks governments worldwide in terms of their readiness to use AI to deliver public services to their citizens. Building on last year’s Index,

there were a few changes in the way people wanted to do it to ensure that this year's version is as robust and includes a measure of government AI readiness as much as possible.

The Building Blocks of Government AI Readiness:

1. Government needs to be committed to using AI, and be able to adapt and innovate to do so;

2. Government needs good provision of AI tools from the technology sector; and

3. These tools need to be built and trained with high quality and representative data, and require the right infrastructure to be delivered and used by citizens.

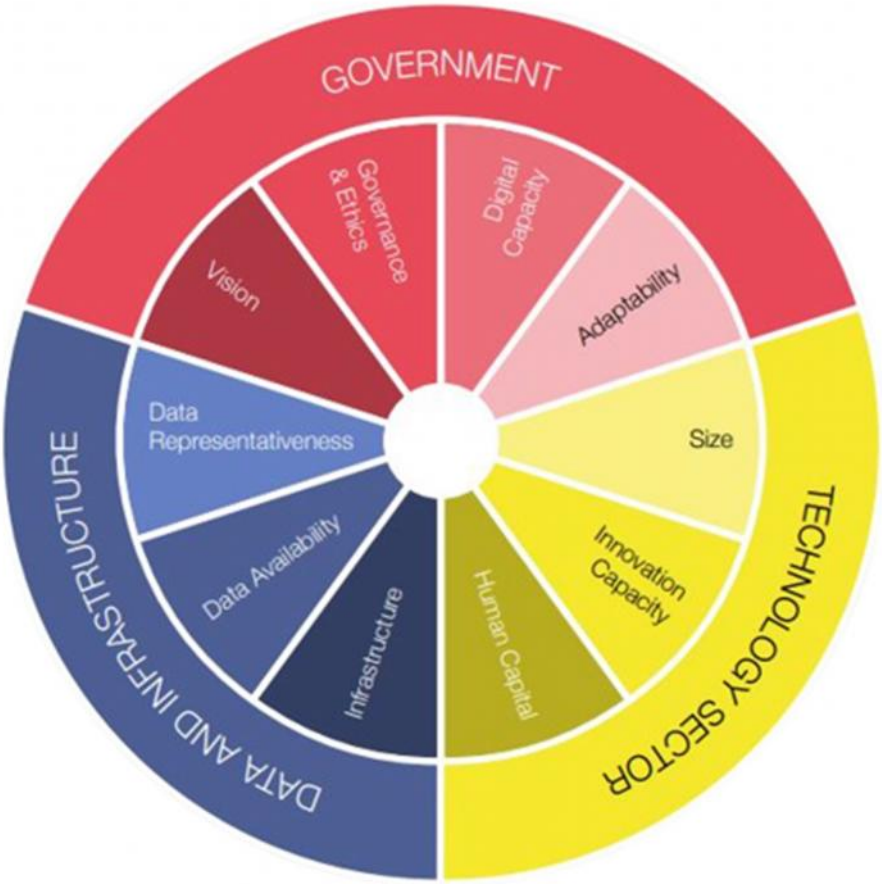

Fig. b: The pillars and dimensions of the Government AI Readiness Index (oxford insights 2020)

The United States of America is at the forefront of this year's index, with the other five top destinations heading to Western European countries (UK, Finland, Germany and Sweden). All of these countries scored high on all three pillars of the Index: government, technology, and data infrastructure. Four of the top five have already published national AI strategies for the year 2020, and the US launched the American AI Initiative by the end of 2019.

The US is famous for establishing a private sector, and 'Silicon Valley' is almost identical to high-tech technology. This power is reflected in its ranking: it has the highest score in the technology sector pillar by about ten points. In particular, the US is making high marks on the number of unicorn technologies and its public technology companies have a very high market share value. While small startups and research institutes can produce great success in AI, these big technology companies like google, amazon, Facebook and IBM are important in driving and marketing AI research. Although the US is also making good points in government and the data and infrastructure pillars (ranked 2nd and 7th in the world respectively), it is at a crossroads in terms of the power of re-engineering its technology sector where it truly has a limit on AI.

After North America, the region with the most points on average is Western Europe. Although the region does not yet have the technical facilities associated with Silicon Valley, Germany, the UK and Sweden are all at the highest level of the technology sector pillar. While the region excels in terms of data and infrastructure pillar, with the UK ranking first in the world followed by Sweden, Finland is in fourth place.

Moreover, it is not measured directly by the Index but particularly noteworthy in Western Europe the level of cooperation between countries to support AI development. In February 2020, the European Commission published its white paper on 'Artificial intelligence- a European approach to excellence and trust', setting out the EU's comprehensive strategy to make the region a global center for excellence in AI. As the European regime progresses, this could have a positive impact on many countries throughout the region, strengthening Western Europe's position as one of the government's best AI readiness centers.

Businesses define AI readiness as the raw materials and enabling factors needed to make AI implementation possible. China lags behind many Western nations on some of these indicators, especially for its technological infrastructure, with lower Internet and mobile phone penetration and uneven broadband coverage. However, in terms of implementation, we would argue that China is making better use of the capabilities it has, than many other countries in the top 20 of the Index.

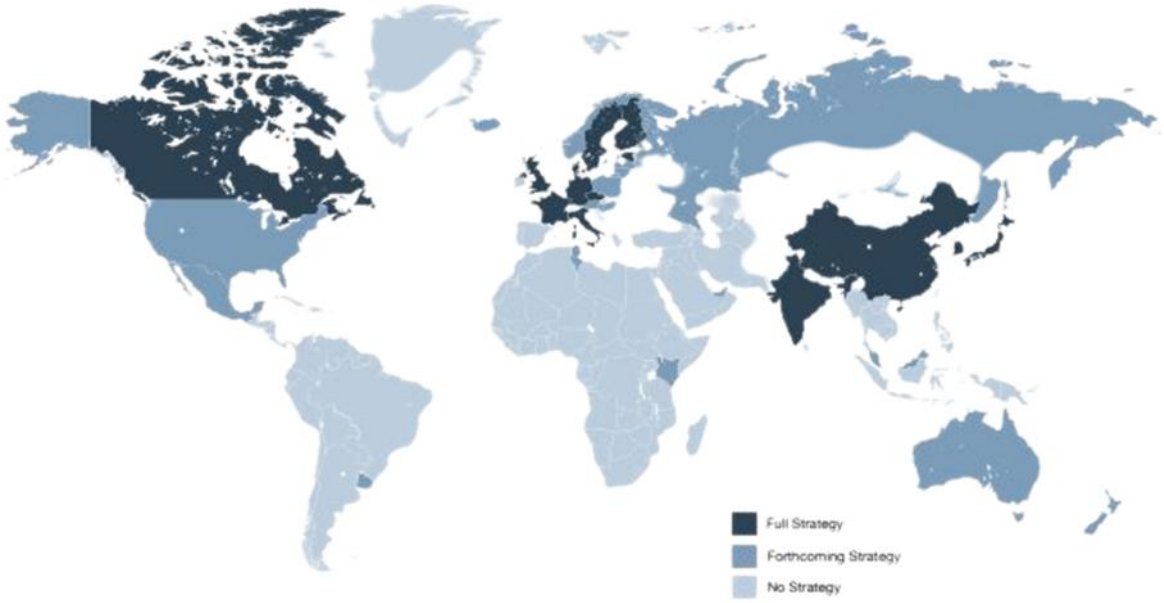

Fig. c: National AI Strategies in the 2019 Government AI Readiness Index

Compared to the 2019 Index, we can see a clear increase in the number of countries developing or publishing AI strategies, as shown in the maps above figure c.

India has published the National Strategy on artificial intelligence in 2018. Written by the NITI Aayog Government Think Tank, this strategy sets out some AI focus areas in India, including Healthcare, Agriculture and Smart Mobility. NITI Aayog also helped run pilot AI projects in these areas - working with IBM to test AI in agriculture.

India also has an AI Task Force advisory, launched in 2017. The Task Force report from 2018 highlights the development of public services as one of the major AI issues in India. However, India scores significantly lower on the scope of Compliance and Governance and Ethics than on the other two dimensions in the pillar of government. This may suggest that obstacles to the use of AI in government include the difficulty of implementing and maintaining change, as well as the creation of a strong AI governance framework. India's National Strategy highlights 'privacy, security and ethical principles' as one of the challenges of adopting AI.

Summary

AI technology is no longer the field of future scientists but an integral part of the multi-agency business model and an important strategic element in the plans of many business, medical and government sectors around the world. Conversational AI (CAI) communication agents are found everywhere in the lives of adults and children in the developed world. Users interact with these programs to obtain a product or service related information, place an online order of products, or order food in real time. Chatbots are evolving to simplify and make access to digital services

personal. Artificially intelligent (AI) voice assistants (VAs), such as Amazon's Echo (Alexa), Apple's Siri, Microsoft's Cortana, and Google's Google Assistant, are instrumental in changing the way consumers use firms to seek service assistance, obtain information, and purchase products. As technology advances rapidly, there appears to be a race among major countries to articulate standards for artificial intelligence. Obviously, it's about fostering innovation. But beyond innovation, there is also an ethical problem with AI that governments expect to address with specific regulations. Artificial intelligence relies on huge datasets of individual users, and there is a lot of debate about who owns this information and how that information is used to further manage AI applications and related services. Globally governments are trying to implement specific systems and strategies for building AI algorithms and collecting data throughout the process. Developing standards that improve the quality of AI products and services can also reduce the risk that the public will react negatively to this technology. As companies change and transform their business models and processes to take advantage of the benefits of AI, the bottleneck lies in the imagination, management, and most importantly, the implementation of the company's business. ". This thesis work aims to identify the range of dimensions and elements of a readiness model framework to help implement AI in business structures.

CHAPTER 2. THE METHODOLOGY AND PLAN OF STUDY

2.1 Relevance of the study

As the new age of artificial intelligence (AI) approaches, it's an amazing time to improve the customer experience with huge customer benefits and lightning-fast customer service. As AI technology advances, forward-thinking organizations are incorporating conversational AI into their strategic investment plans to be used for customer service. In fact, Gartner predicts that "cloud first, mobile first" will replace "talk first" as the most important and important imperative for the next decade.

Over the past decades, customer service and experiences have changed from call centers, websites, emails, apps, etc. associated with customers seeking help. However, the way we interact with technology has changed dramatically over the past few years. , and the good old days of clicking an icon are over. An organized and intelligent way to give a conversational experience to mimic conversations with real people, through digital technology and telecommunications.

Conversational AI can process more requests from humans, provide relevant and accurate information faster, and increase accuracy and complexity over time. Humans and Machines - Using AI, people will be able to devote more time to exceptional work: 20% of non-standard tasks

that provide 80% of value creation. Processes - smart machines will continuously control end-to-end processes and implement "intelligent automation of process change" to refine and optimize.

Gartner report says:

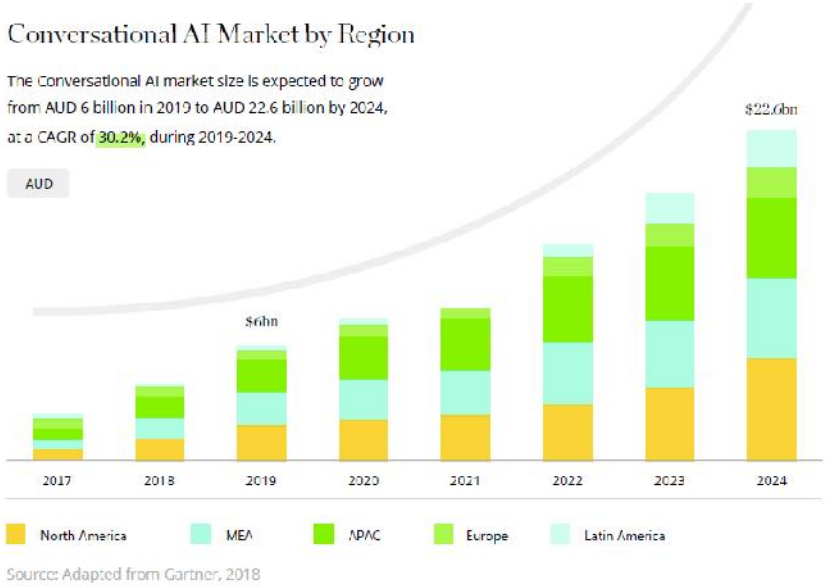

Figure d: Conversational AI market by region (AU Deloitte report)

The customer experience is the next competitive battleground. Companies are embracing new technologies and constantly reinventing themselves to stay one step ahead of others. With the advancement of speech recognition and NLP, speech artificial intelligence has become a new frontier that is truly transforming the customer experience and making it more unified and collaborative. As, smart assistants are still considered less advanced in "social" intelligence, making them utilitarian and impersonal.

However, the incredible opportunities and lucrative uses of bots indicate that they are here to stay and evolve into smarter agents who are revolutionizing the customer experience in more meaningful ways. This makes the topic very interesting and relevant to study.

2.2 Research gap

AI technologies will have a major impact on economic development and the nature of work in the years to come. It will also radically change the dynamics of competition in many sectors. This is why many leaders believe their country's future is at stake. Not surprisingly, governments are

rushing to do research and development to encourage investment in AI, create training programs, and support businesses within their borders.

In fact, many governments have developed formal AI frameworks to stimulate economic and technological growth. These range from the US President's AI Leadership Ordinance and China's Next-Generation AI Plan to German-made AI and Pan-Canada Strategy, Research and collaborative partnerships. But governments face deeper technological and economic challenges. Many are considering how they can provide privacy, security, transparency, accountability and control over AI-powered systems without sacrificing innovation and potential economic benefits.

Despite intense competition between countries and companies, Conversational AI should not be viewed as a zero-sum game. All users can learn from each other, and initial success is likely to depend on good practice, choosing the right use cases, training staff, and managing risks and issues.

The study aims

- To explore whether there were clear differences in how Conversational AI is impacting their businesses and how different countries are promoting AI efforts and analysing the performance of leading conversational AI companies based on open datasets.

Talking about found research gaps, it is worth mentioning that international AI community uses no commonly accepted approaches to the identification of the most developed AI countries. The state of AI is so new that not only countries or companies, but also international organizations have now set up the first versions of general AI standards. All AI shareholders understand the technology, or namely speaking, the set of Conversational AI sub technologies, differently (it can be easily seen from the analysis of AI application in Conversational AI Tech).

2.3 Research questions

Taking into consideration the found research gap, the author of Master Thesis states the following research aim that is to consider Conversational AI Tech companies in AI leading countries, identify and analyze their and their investors' unique features, and estimate how developed in terms of Conversational AI Tech companies AI leading countries are based on Open datasets

In order to achieve the stated above aim, the following research questions are to be answered:

RQ1. What are the most developed AI countries? What are their policies and approaches to state regulation of Conversational AI?

RQ2. What are the most representative Conversational AI Tech companies, according to the Open datasets? What are the analysis of performance of leading companies?

RQ3. What are typical investors of Conversational AI leading companies in mentioned above databases (which type of investor and on what stage of funding)?

2.4 Methodology

Systematic literature review (SLR) is a form of literature review that follows a specific review protocol and quality procedures to answer specific research questions.

SLRs have been used in medical research since the early nineties, support evidence-based practice and assist physicians in making decisions(grant et al; booth et al, 2009). Since then, the evidence-based approach has been expanded from medical to other areas, as well as SLR guidelines from medications (Higgins et al; green et al; Cochrane et al 2006) are converted to other prescriptions, especially in Information Systems(kitchenham et al 2004) , management (transfield et al; denyer et al; sart et al, 2003), and social research(arksey et all; malley et al, 2005).

This literature review is a tertiary study, as it incorporates evidence from other SLRs, used as key studies for further analysis. This type of the review is also known as 'umbrella study'(pare et al; trude et al; jaana et al; kitsiou et al, 2015). This study is based on SLR guidelines from Kitchenham and Charters (kitchenham et al 2007).

Apart from literature review there are open datasets that are analysed to answer specific research questions. The open datasets are gathered from CB insights and also self-created datasets through various internet journals and websites with relevant informations.

2.5 The search process

Two searches were performed on the 10th of Feb 2020 using the graduate school of management, Saint Petersburg state University Online Library (SPBUOL) search facilities. The SPBUOL performs a search over different library databases, including Scopus which has the widest coverage of peer-reviewed journals (guzman et al, 2019). The search strings used for the two searches are shown in Fig. 1. These strings were developed using the AI terms from the most recent AI index report.

2.6 The study selection process

The selection process is shown in Fig. 6. The primary search using the search string, resulted in 1524 peer-reviewed SLRs on AI published between 2013 and 2022 in English language. This list was reduced to incorporate only publications from the conversational AI disciplines leading to

839 papers (step 2). After reading the abstracts, and applying the exclusion criteria listed below, 541 publications were selected for further analysis (step 3). After the standard assessment described in section 2.4, 15 articles were excluded leading to final 41 publications. The particular inclusion and exclusion criteria applied within the selection.

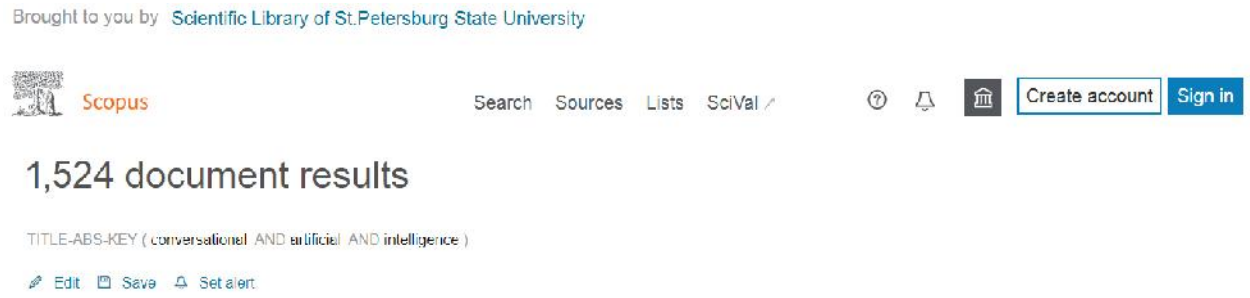

Fig 2.

Fig.3.

Fig.4.

Fig. 5.

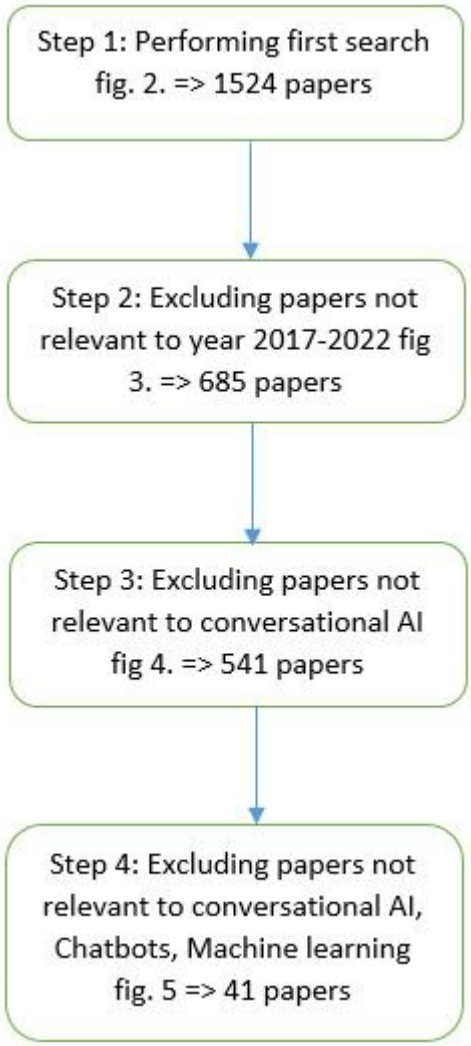

Fig. 6. Research paper selection process flow

2.6.1 Inclusion criteria

1) Studies published after 01/01/2017.

2) Publication type is journal article or conference paper.

3) Publication language is English

4) Studies that are directly associated with conversational AI. E.g. use of AI in Chatbots.

5) Papers cited in selected papers that are directly related or relevant to the subject of the literature review.

2.6.2 Exclusion criteria

1) Not peer- reviewed publications such as: newspapers, books, and dissertation

2) Search output having repeated entries.

3) Publications where abstract is obtainable.

4) Papers not specifically associated with AI but to technology normally.

5) Technology reviews during a specific conversational AI area.

2.7 quality assessment

Eight quality assessment questions are devised to assess the credibility, relevance and rigour of the 41 studies obtained in step 4 of the choice process (Fig. 6):

1. Does the publisher have an honest reputation? Eg. Elsevier, Springer, Taylor and Francis, Emerald, SAGE, Oxford press were considered one amongst the leading publishers.

2. What role did AI play within the review? E.g. Conversational AI technology into consideration

3. What style of review has been performed?

4. Has number and quality of primary studies been reported?

5. Are years covered within the review known?

6. Have specific SLR guidelines been reported to be followed within the review?

7. Has the info analysis method been described?

8. Have the research questions been clearly defined?

2.8 data extraction and analysis

The data extracted from the chosen 25 studies included the subsequent items:

• Bibliographic information such as: citation, title, abstract, publication year, publication type, publication title, and keywords[11.9] .

• Literature Review quality related information: publisher, the AI role, sort of review, number of primary studies, online databases, years covered, Literature Review guidelines, search string (only the AI-related substring), data analysis method, and research questions.

• Research questions related information: business sector/or business function, main findings, consideration of bias, consideration of ethics, other human and social consideration like trust or privacy, barriers for the AI adoption, drivers for the AI adoption, and recommendations[11.9].

The extracted data from open datasets were stored in an excel spreadsheet table and ready for further analysis by categorising non numerical values where possible (e.g. company, category), to enable analysis of results. This was followed by a thematic analysis of qualitative data extracted for answering the research questions RQ2-RQ3. Thanks to the exploratory nature of the research, the analysis process was supported the inductive approach (saunders et al;lewis et al; thornhill et al, 2019). In an inductive approach, the start line within the analysis are the info and also the themes are emerging from the info through an iterative process comprising reading, interpreting, summarising and grouping (categorising) the information. The resulting categories are presented within the following section [11.9].

Summary

Over the past decades, customer service and experiences have changed from call centers, websites, emails, apps, etc. associated with customers seeking help. However, the way we interact with technology has changed dramatically over the past few years. , and the good old days of clicking an icon are over.it is worth mentioning that international AI community uses no commonly accepted approaches to the identification of the most developed AI countries. The state of AI is so new that not only countries or companies, but also international organizations have now set up the first versions of general AI standards. Taking into consideration the found research gap, the author states the following research aim that is to consider Conversational AI Tech leading companies in countries, identify and analyze their performance and their investors' unique features, and estimate how developed in terms of Conversational AI Tech companies in countries based on Open datasets. the methodology that has been adopted is Systematic literature review which has been used since early nineties in medical field and later it has been expanded to information system and business and management. The study selection process has been applied using the search string that resulted in 1524 peer-reviewed SLRs on AI published between 2013 and 2022 in English language. This list was reduced to incorporate only publications from the conversational AI disciplines leading to 839 papers. After reading the abstracts, and applying the exclusion criteria listed below, 541 publications were selected for further analysis. After the standard assessment, 15 articles were excluded leading to final 41 publications. The particular inclusion and exclusion criteria applied within the selection. Further data extracted from the chosen 25 articles. The extracted data from open datasets were stored in an excel spreadsheet table and ready for further analysis by categorising non numerical values where possible (e.g. company, category), to enable analysis of results. This was followed by a thematic analysis of qualitative data extracted for answering the research questions.

CHAPTER 3. FINDINGS AND DISCUSSION

3.1 Research Question 1.

What are the most developed AI countries? What are their policies and approaches to state regulation of Conversational AI?

The Top 3 most Developed AI countries based on AI Readiness index (Fig.1) are USA, UK, and Finland.

All countries ranked by index

Rank	Country	Index
1	United States of America	85.479
2	United Kingdom	81.124
3	Finland	79.238
4	Germany	78.974
5	Sweden	78.772

Figure 7. Government AI Readiness Index 2020 (oxford insights)

United States of America:

Artificial Intelligence (AI) has the potential to create a wide range of industrial developments, while raising legal questions and ethical principles that may define the next generation of technological advances. Companies with AI-based products and services must carefully monitor and respond unsettled and changing the regulatory environment of AI-specific rules.

A recent chain of AI-related work has emerged from the U.S. Department of Commerce. (DoC) —including the movement towards the development of a risk management framework.

In the 2021 National Defense Authorization Act, Congress directed the National Institute of Standards and Technology (NIST), under the auspices of the DoC, to establish a “voluntary risk management framework for reliable AI systems.” In July, NIST released the Information Request (RFI) looking for inputs to inform the development of the AI Risk Management Framework (AI

RMF). AI RMF can have a significant impact on how companies and organizations deal with AI-related risks, including avoiding bias and promoting accuracy, privacy, and security.

In September, the DoC re-established the National Artificial Intelligence Advisory Committee (NAIAC) in line with the National AI Initiative Act of 2020. NAIAC will "advise the President and other public bodies on a range of strategic issues," and will make recommendations on "the current state of US AI competition, the state of science surrounding AI, issues related to AI staff" and how AI can improve opportunities. People who were not historically well represented, among other topics.

Given its responsibilities and engagement with AI, the DoC — and NIST in particular — seems to be at the center of the organization's AI control approach.

In April, the Federal Trade Commission (FTC) published a blog post entitled "Aim for truth, fairness, and equity in the use of your company AI" (FTC Memo). The FTC Memo makes it clear that the FTC will exercise its authority under Section 5 of the FTC Act, as well as the Fair Credit Reporting Act (FCRA) and the Equal Credit Opportunity (ECOA) Credit Act to monitor the use of biased algorithms. The FTC sets the road for what is expected of them, saying companies should "remember that if you do not respond, the FTC can do it".

Among other things, companies are expected to:

- Rely on integrated data sets: "companies need to think about ways to improve their data set, design their own model to address data gaps, and — according to any shortcomings — limit their use of the model anyway."
- Check their algorithms "both before and after companies use them — to ensure that they do not discriminate on the basis of race, gender, or other protected class."
- Be honest with customers about how their data is used and do not exaggerate what the algorithm can bring.
- Be transparent and independent, "for example, through transparent frameworks and independent standards."

FTC Statements are the first step for companies to prevent AI bias in operation, and companies that develop and implement AI should consider ahead as they assess and address potential AI risks.

In September, the E.U.-U.S. The Trade and Technology Council (TTC) has released its first Joint Statement. TTC is committed to working together to develop "new and credible AI systems that respect international human rights and shared democratic values," as well as "support and implement the OECD Recommendation for Innovative and Discussable" tools for evaluation and

evaluation. . . exploring the technical requirements of a reliable AI. ” TTC will conduct joint economic research to assess the impact of AI on the future of the labour market.

The Food and Drug Administration (FDA) has released Artificial Intelligence / Machine Learning (AI / ML) -Based Software as a Medical Device (SaMD) Action Plan (Action Plan). SaMD is software based on AI / ML and is intended to treat, diagnose, treat, reduce, or prevent disease or other conditions. The Operational Plan stipulates that the FDA intends to oversee the implementation and development of AAM / ML-based SAMD, which includes reviewing the proposed regulatory framework outlined in its 2019 discussion paper. The FDA recently held a public workshop on the topic of transparency in AI / ML-enabled medical devices and accepted comments until 15 November 2021.

National Security Commission and Government Accountability Office (GAO)

On March 1, 2021, the National Commission for the Security of Intelligence (NSCAI) released and submitted its final report to Congress. The report recommends that the government take certain domestic measures to protect privacy, civil rights, and civil liberties in its use of AI. The report notes that a lack of public trust in AI in terms of privacy or public rights / civil liberties will undermine the deployment of AI to promote US intelligence, national security, and law enforcement. The report recommends that the public sector move forward in promoting reliable AI, which may have an impact on how AI is used and managed in the private sector. Figure 1 shows countries published and developing AI strategies.

Similarly, in June 2021, GAO published a report outlining key processes to help ensure accountability and responsible use of AI by government agencies and other stakeholders involved in the development, development, implementation, and ongoing monitoring of AI systems. The report identifies four key areas of focus: (1) organization and algorithmic governance; (2) system performance; (3) record and analyze data used to develop and implement an AI system; and (4) continuous monitoring and evaluation of the system to ensure reliability and efficiency over time.

Figure 8. Countries with Published AI Strategies

The Next Steps

Although there is currently no AI regime in the U.S., regulators have sent a clear message that AI control is imminent. Companies must develop policies and procedures throughout the organization to develop a compliance plan that enhances AI renaming, but also ensures the visibility and clarity of the systems. Companies should also regularly review and update their application and document these processes to comply with regulators who may require additional information (Heather et al; Ryan et al; Alyssa et al, 2021).

United Kingdom

Artificial Intelligence (AI) is a rapidly growing deep technology in the world, with great potential to rewrite the laws of all industries, furthering economic growth and transforming all spheres of life. The UK is a major global power in AI and is well positioned to lead the world over the next decade as a real center for research and innovation, a global talent base and a thriving business and business space.

Many of the UK's success in AI was underpinned by the 2017 Industrial Strategy, which set the government's vision for making the UK a global hub for AI innovation. In April 2018, the UK government and AI ecosystem agreed to a nearly $ 1 billion AI sector agreement to boost the UK's global position as a leader in the development of AI technology. This new National AI Strategy

builds on the UK's strengths but also represents the beginning of a step-by-step change in AI in the UK, recognizing AI's potential to increase productivity, resilience, innovation and growth across the private and public sectors. This is how UK will prepare for the next decade, and is based on three assumptions about the next decade:

1. Key drivers of development, acquisition and strategic advantages in AI access to people, data, computer and finance – all facing global global competition;
2. AI will be commonplace in many economies and action will be required to ensure that all sectors and regions of the UK benefit from this change;
3. Our governance and regulatory principles will need to be aligned with the rapidly changing needs of AI, boost growth and competitiveness, promote UK success in innovation, and protect the safety, security, choice and rights of our citizens.

The UK National AI Strategy therefore aims to:

- Invest in and plan the long-term needs of the AI ecosystem so that we can continue our leadership as science and greater AI power;
- Support the transformation of the AI-enabled economy, capture the benefits of innovation in the UK, and ensure that AI benefits all sectors and regions;
- Ensure that the UK acquires national and international domination of AI technology to promote innovation, investment, and public safety and our core values.
- This will be best achieved through the trust and support of the community, and through the involvement of different community skills and ideas. (gov.uk et al 2021)

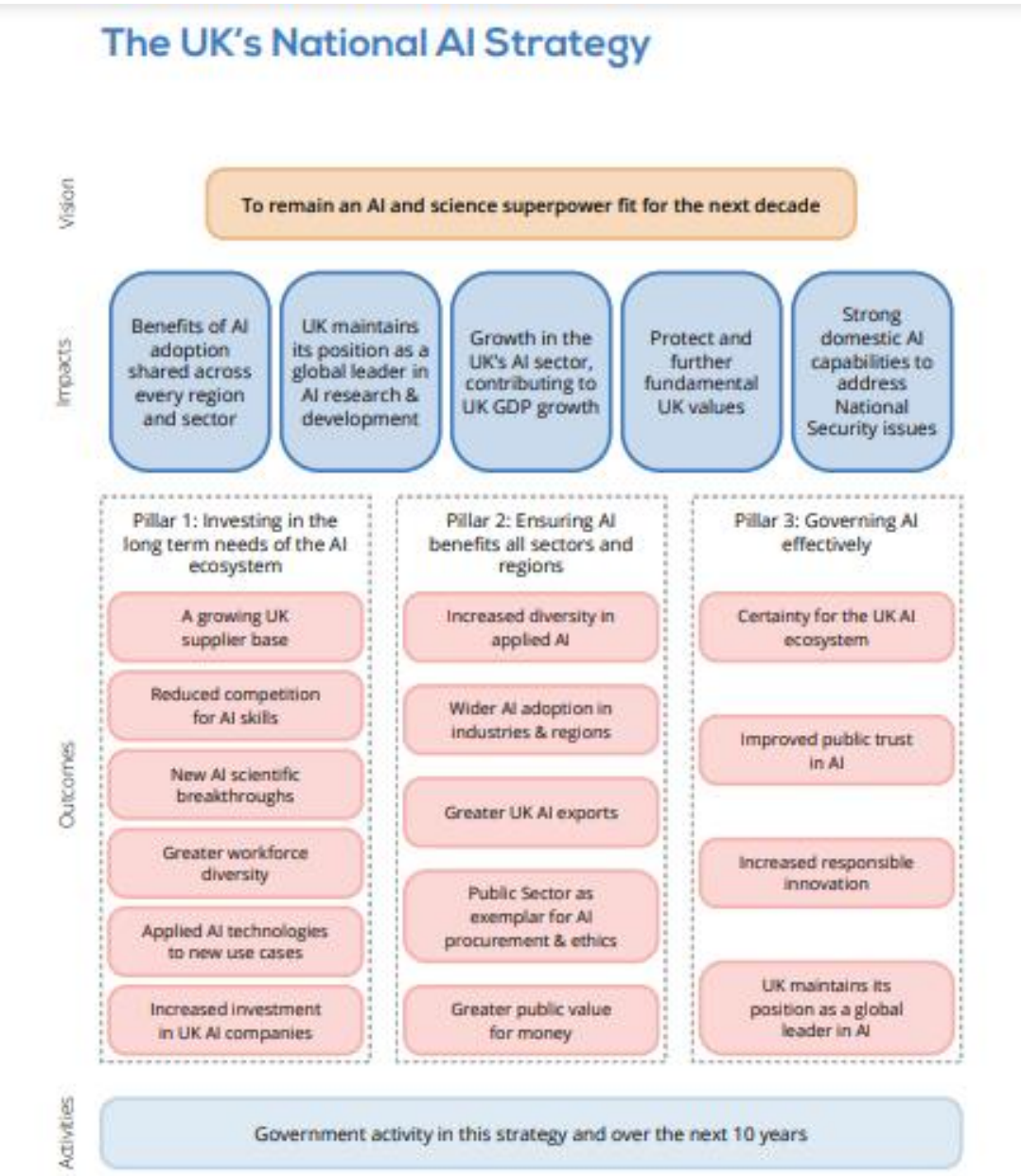

Figure 9 : UK National AI Strategy

Finland

In October 2017, the Finnish Ministry of Economic Affairs and Employment published a national AI strategy entitled Finnish years of artificial intelligence (Finland, 2017). The report falls under the umbrella of the Finnish Artificial Intelligence program (also renamed AI Finland) with the aim of establishing AI and robots as the basis for the success of Finnish companies.

The strategy highlights Finland's market opportunities and its strengths and weaknesses in AI. It describes how AI will transform society and provides a range of policy actions and recommendations for Finland to succeed in AI years.

The goal was to position Finland as the world leader in AI. Finland then adopted an open data policy aimed at creating sufficient conditions for successful AI development. Overall, the strategy tried to do the following:

- Increasing business and industry competition;
- To provide quality public services and improve the efficiency of the public sector;
- Ensuring a prosperous society and the well-being of its citizens.

Policy initiatives of Finland

Ai business program

In 2018, with public funding of up to EUR 34 million and a total of 115 projects, the AI Business program, which focuses on AI and the platform economy, was a major Finnish Business program. The program, launched in early 2018.

AI Register

Helsinki and Amsterdam have introduced open AI registers that track algorithms used in municipalities.

The artificial intelligence programme

The practical intelligence program, which published its interim eight-point report in October 2017 and the final report in 2019, guided Finland on the path to becoming a world leader in the use of artificial intelligence.

Aurora AI

Aurora AI is a network of diverse intelligent services and applications that "allow [public] managers to better expect and provide services for future service needs" and allow citizens to access 24/7 high quality digital services.

Finland's Artificial Intelligence Accelerator

FAIA assists Finnish organizations using artificial intelligence (AI). Its members are drawn to the original AI concept, reaping benefits together.

Finland Fit for Digital Program

The Finland Fit for Digital Program is a step towards integrating national efforts to promote digital business venture.

Finnish Centre for Artificial Intelligence

FCAI is the national Artificial Intelligence Skills Center in Finland, founded by Aalto University, the University of Helsinki, and the VTT Technical Research Center of Finland.

Leading the path into the Age of Artificial Intelligence

The final report released by the Steering Group, entitled "Leading the Way to a Practical Wisdom" (June 2019) outlines 11 key actions that involve all sectors to help Finland achieve its goal of excellence.

Lumi Supercomputer

The procurement contract for LUMI, EuroHPC's new predecessor for expanding supercomputers, has been signed by European High Performance Computing Joint Undertaking (EuroHPC JU) and Hewlett Packard Enterprise, a select vendor.

National Regulation on Automated Decision-Making

In Finland, the Department of Justice and the Ministry of Finance are currently reviewing national legislation on automatic decision-making. (oecd.ai)

India

The development, adoption and promotion of AI has been clearly at the top of the Indian Government's priority list, a method based on the premise that AI has the potential to make life easier and socially equitable. The Union Government in 2018 has allocated significant financial support for research, training and skills in emerging technologies such as AI, which is 100% growth over previous investments. This priority for digital technology is not new. Digital India envisions the provision of digital infrastructure as an essential resource for every citizen, incorporating that digital integration into governance and ultimately leading to citizen empowerment. Increases in funding for research, training and skills in emerging technologies such as AI are made under the umbrella of the Digital India program. Government has also begun working to ensure that AI technology is made in India, and made to work for India and, fully suited to its Make In India program. Although AI has been seen as an important consideration in digital technology in general, many efforts focused on AI alone have also emerged. This section will provide an overview of the key features of each step in the scope of this article, and it is not intended to be a complete analysis of each (vidushi et al' 2018).

Artificial Intelligence Task Force

The Department of Trade and Industry has established the Artificial Intelligence Task Force August 2017 for the purpose of 'embedding AI into our Economic, Political and Legal Thinking processes' in order to have a systematic ability to support the cause of India becoming one of the leaders of a economy rich in AI '(AITF 2017). With a broad view that AI is a social and economic problem solution on the scale, their March 2018 report identified ten areas of AI interaction in India. These include manufacturing, financial technology or FinTech, agriculture, health, technology diversity, national security, the environment, social services, retailers and customers relationships, and education. The report sought to understand exactly what the role of government should be, and how AI can solve problems at the highest level. Recommends, among other things, the establishment of the main agency, the National Artificial Intelligence Mission to do so link AI-related activities in India. While the report lists features that allow for widespread adoption of AI and mapping certain government institutions and services that would encourage such growth, fail logically addressing ethical, social, and technical barriers that emphasize the use of AI technology. Even in a few cases where the report considers data privacy and protection, it does not go far enough to fix problems with data other than AI. For example, in addressing the issue of ethics and public safety, the Task Force acknowledges this challenges of data sharing and data access by third parties. Although it affects the concern of data privacy, fails to consider data-driven decision-making embedding once perpetuates historical prejudice and discrimination. Powerful algorithmic power with good intentions programs that will have negative consequences for vulnerable and disadvantaged communities it is also left unattended. This excess is reflected in the Task Force sector analysis. For example, challenges identified in the FinTech field include anticipation of market demand and measurement scale as well new. Problems related to how FinTech growth will play for people in data collection engines and technology inserts are left completely unthinkable. Probably most Sadly, the impact of AI technology on the use of fundamental freedoms has been overlooked, and the use of AI for 'independent and combat surveillance systems' was excluded the appropriateness of the negative effects that technology has on privacy and freedom saying.

The work of the Task Force aims to clarify the direction in which AI policy in India should be improved. Its focus on access technology is probably its greatest potential. However, the lack of the involvement of the law, policy, and civil society within the system was made explicitly expedited (best) ethical and social analysis of India AI landscape.

Ministry of Electronics and Information Technology

In February 2018, Ministry set up four committees to pave the way for the national AI program. The four committees are studied AI in the context of citizen-centered services; data forums; skills, innovation and R&D; and legal, regulatory and cybersecurity ideas.

NITI Aayog National Artificial Intelligence Strategy: #AIFORALL

National Institution for Transforming India (also known as 'NITI Aayog'), a state-owned research institute, tasked with producing national practical intelligence policy to direct government AI efforts. In an effort to improve economic productivity in India, NITI Aayog partnered with Google in early May 2018 to train and focus on startups look to develop and integrate AI-based solutions into their business models. NITI Aayog also entered into a statement of intent with ABB India 'to make important sectors of the Indian economy right for a digital future and see the power of AI, big data and communication 'by the end of May 2018 (hebbar et al, 2018). In an interview paper released in June 2018, NITI Aayog states the full goal of The national AI strategy as one that will, "AI grow the economy, develop the community and inclusive growth, and ultimately as a "Garage" for emerging and developing economies." NITI Aayog's role goes beyond recommending a policy approach, its involvement is inclusive implementation and distribution as well. The National Strategy goes further than any other AI policy process in two different ways. First, it acknowledges that AI discovery has been commercially successful so far, too recognizes "the need to balance between narrow definitions of financial impact and even better. " Second, it recognizes that AI applications should be adopted increasingly, instead of having a number of changes in the various sectors. Despite this encouraging change in perspective, tangible recommendations and reviews India's national strategy for AI leaves much to be desired. The report identifies five primary sectors where AI can have a positive impact on society that requires government to play a key role: education, agriculture, health care, smart cities and infrastructure, and smart mobility & transportation. While discussing smart cities, the report encourages the use of AI for surveillance applications. This includes AI systems that predict crowd behavior and can be used to manage crowds, "sophisticated monitoring systems" that can keep a check on the movement of people once and for all ethics, and intelligence forums that can help public safety. Important limitations, both accuracy and fairness, and the negative impact of monitoring of value rights were not reflected in the report recommendations in the context of smart cities. This of particular concern as the Indian monitoring framework already has a problem of insufficient supply protective protections against potential violations of the rule of law authorities (Bailey et al; Bhandari et al, 2018). Powerful AI monitoring should thus be a slightly different alternative than that than usual. In negotiating justice in AI systems as a matter of concern, the report recognizes that bias is embedded data, which is likely to be the case over time. it recommends that a possible way to deal with this, is to "see the built-in bias and evaluate its effect, and find ways to reduce bias ". The ceteris-paribus method is required, i.e. everything else staying balanced, by simply identifying and minimizing bias in databases one can hope to offer the best results, where the fact is that biased data comes from bias, inequality, discrimination, and an unjust world. The limit to this approach is that it looks at AI as a mathematical model alone, and not as a social-technological system. To reduce bias between these systems, it is important that understand and

adapt to the social environment in which they will work. Indeed, the goal should be to avoid the consequences of prejudice. As Eubanks said, out there automated decision-making tools designed to break down structural inequalities, their use will only work strengthen (Eubanks et al, 2018).

40% of the world's AI garage

In addition to providing unique opportunities, India provides a complete "playground" for businesses and institutions around the world to develop solutions that can be easily used in all developing countries and economies. Simply put, Resolving India means resolving 40% or more of the world. An advanced AI-based solution for early diagnosis of tuberculosis (one of the 10 leading causes of death in the world), for example, can be easily distributed in Southeast Asia or Africa, once developed and developed in India. Apart from health care, AI technology in other fields including agriculture, education and travel is planned to transform the world. The similarity of the news about the above sectors in all developing countries provides an ideal environment for the development of AI solutions that can be adapted to multiple markets. Therefore, AI technology suitable for the Indian agricultural sector can be easily customized for some developing countries depending on their climatic conditions. Education continues to be a major problem in almost all developing lands. AI technology that is able to transfer quality education to the people of India in a variety of languages can be very useful to other developing nations. Another feature of India's strength as a leader in AI is the proven track record provider of the technology solutions of your choice. Resolved in India (or more accurately, solved by Indian IT companies) could be an advanced model of Artificial Intelligence as a Service (AIaaS). Indian IT companies have pioneered the delivery of technology and development products as solutions around the world. As AI matures and common applications become more commonplace, its advantage in India when it comes to large-scale implementation. In addition, India's strengths in IT combined with opportunities, such as collaboration between many languages, provide much needed impetus to find uncontrollable solutions to global problems, such as NLP.

Artificial Intelligence has the potential to generate significant increases in a wide range of fields globally, and is expected to be an important source of competitive profit for firms.

a) Health Care: The use of AI in health care can help address the problems of high access barriers health facilities, especially in rural areas with poor communication and limited facilities of health workers. This can be achieved by using such operating conditions AI-driven diagnostics, personalized treatment, early diagnosis of potential epidemics, and photographic diagnosis, among others.

b) Agriculture: AI promises to drive food reform and meet growing demand with food (global demand to produce 50% more food and cater for an additional two billion people by 2050 compared to today). It also has the ability to deal with challenges such as inadequacy forecasting, lack of reliable irrigation, and overuse / misuse of pesticides and fertilizers. Some use cases

include improved crop yields through real-time advice, improved insect detection invasion, and predicting crop numbers to inform sowing processes.

c) Smart Mobility, which includes Transport and Operations: Potential use cases on this domain include private flight sharing, independent features such as pilot assistants, and forecasting engine monitoring and maintenance. Other areas that could affect AI include freight transport and delivery, and improved traffic management.

d) Marketing: The marketing industry has become one of the first recipients of AI solutions, with applications such as improving user experience by providing personalized suggestions, browsing based on preferences and image-based product search. Other conditions of use include longing for customer needs, improved asset management, and effective service delivery management.

e) Production: The manufacturing industry is expected to be one of the major beneficiaries of AI. based solutions, thus creating a 'Industrial Future' with flexible technology automated systems processes and equipment to respond to unusual or unexpected situations by making wise decisions. Areas of impact include engineering (AI for R&D efforts), supply chain management (demand forecasting), production (AI can achieve cost reduction and expansion efficiency), care (predictable care and increased consumption of goods), quality authentication (eg visual systems with machine learning algorithms to identify errors and deviations in product features), as well as the use of plants and storage space.

f) Energy: Potential operating conditions in the energy sector include modeling of the energy system and forecasting reduce prediction and increase efficiency and energy efficiency. In recovery power systems, AI can enable energy storage through intelligent grids powered by smart meters, and also improves the reliability and accessibility of photovoltaic power. Same with production in the field, AI can also be used for predictable grid infrastructure improvements.

g) Smart Cities: AI integration of newly developed smart cities with infrastructure can also help to meet the needs of urban dwellers more quickly and to provide them with an improved standard life. Potential operating conditions include traffic control to reduce congestion and improved safety through use improved crowd management.

h) Education and Skills: AI can solve India's quality and access problems education sector. Potential conditions of use include developing and developing a sense of learning through personal learning, self-efficacy and acceleration of management, and predictability the need for student intervention to reduce dropouts or to recommend vocational training.

3.2 Research Question 2.

What are the most Leading Conversational AI Tech companies, according to Open datasets? What are their performance analysis of leading companies?

Table 1. (Ai-startups.org)

Company	**Category**	**Product Focus Area**	**Country**
Uniphore	conversationalAI	transformational customer service	India
Aisera	conversationalAI	IT, HR, customer service, facilities, and cloud operations.	USA
Hugging Face	social AI	chit-chat, talks sassy, and trades selfies with users.	France
Dialogflow	conversationalAI	speech recognition and NLP	USA
Hi Marley	conversationalAI	SMS texting platform	USA
Rasa	conversationalAI	contextual assistants	USA
Pypestream	customer engagement solution	pragmatic AI and chatbots	USA
PolyAI	conversationalAI	machine learning platform	UK
Voicebox Technologies	conversational AI	ASR, NLU, and TTS apps	USA
Avaamo	conversational AI	Deep learning software	India
yellow.ai	Enterprise AI channel	customer Engagement	India
Semantic Machines	conversational AI	Ecommerce, social networks , productivity software	USA
orbita	conversational AI	Voice first	USA
Level AI	conversational AI	costomer experience	USA
haptik.ai	conversational AI	intelligent virual assistant	India
Kea	conversatioanl AI	customer Engagement	USA
Clinc	conversational AI	personal financial assistant, mobile voice activated	USA

Apprente	conversational AI	vocie based personal assistant	USA
Aktify	conversational AI	conversational collective intelligence	USA
kore.ai	conversational AI	conversational solutions	USA
VoiceStar.ai	conversational AI	voice and ai technology for food service	USA
Eloquent labs	conversational AI	Chatbots	USA
botanic.io	conversational AI	conversational interfaces and avatars	USA
Discovery AI	conversational AI	AI led customer success	India
REZO.ai	conversational AI	instant resolution	India
AskSid ai	conversational AI	Ai solution for retail and consumer goods industry	India
saarthi.ai	conversational AI	multilingual conversational enterprise AI	India
GenieTalk	conversational AI	virtual assistant	India
senseforth ai	conversational AI	AI powered bot	India
the chatmate	conversational AI	chat platform	India
Manthan	conversational AI	business assistant	India
bash.ai	conversational AI	Chatbots	India
Gi Labs	conversational AI	voice and chat enabled virtual assistant	India
reverie technologies	conversational AI	voice assistant for non english speaker	India

Table 2. Top 5 Leading Conversational AI companies are:

Company	**Category**	**Product Focus Area**	**Total Disclosed Funding ($M)**	**Country**
Uniphore	conversationalAI	transformational customer service	610	India

yellow.ai	Enterprise AI channel	customer Engagement	102.15	India
Aisera	conversationalAI	IT, HR, customer service, facilities, and cloud operations.	90	USA
Hugging Face	social AI	chit-chat, talks sassy, and trades selfies with users.	60.2	France
Hi Marley	conversationalAI	SMS texting platform	41.7	USA

Uniphore

The analysis of Uniphore performance has been categorised into two parts 1) Innovation and 2) Growth.

1) **Innovation**: Uniphore was born in 2008 where the team developed speech recognition technology, machine learning and artificial intelligence at its core. Since then, Uniphore has been able to record itself somewhere in the speech recognition environment, with many patents on speech development, best-of-type engines and business process management, to help businesses access potential information to drive business results.

   With conditions for use in three main areas - speech statistics, visual voice assistant and voice biometrics for verification, Uniphore has provided other major BPOs, communication centers in India and around the world. They have worked with more than 70 business clients to date and have provided over 4 million end users, with offices in the US, Singapore, and India.

   AuMina- Uniphore's Speech Analytics Technology
   The Uniphore technology captures the real voice of the customer by identifying key phrases spoken during the call and understanding the client's feelings and emotions. It also identifies marketing, cross-selling opportunities and enhances revenue through better collection and targeting areas where agents need to improve. The best quality speech engines are used to ensure language availability (100+ languages) worldwide including 17 Indian languages.

   Uniphore Enters Voice Biometrics With AmVoice
   The company is also embarking on voice biometrics with early launch in rural areas where smartphone penetration is very low. It has seen cases of early use in respect of small

payments and daily wages issued with verification of voice printing. Since then it has been recognized in the BFSI sector worldwide as a unique and secure certification system.

Uniphore's amVoice ™ delivers 99.5 percent accuracy in identifying a person by performing visual analysis of voice flow and comparing it with stored print. The voice cannot be simulated or maintained and played as the volume is tested along with another 18 parameters to ensure that there is no danger.

Virtual Assistant 'Akeira' By Uniphore
Uniphore's akeira ™ is a visual voice provider that provides omnichannel touch points (IVR, mobile, web and more) so that business customers can connect with customer care centers 24/7. In the background, akeira ™ provides a middleware platform that uses advanced speech and NLP (Natural Language Processing) engines to understand the purpose and purpose of voice interaction and to respond intelligently to the customer. akeira ™ addresses the question or request or complaints raised by customers in conjunction with the basic business information systems and CRM systems in the background.

AI and Machine Learning are at the core of Uniphore Product Work. AI and machine learning are part of every solution whether it is still a technology-based keyword patent or product layer. In the tech core, deep AI and ML are used in their speech recognition engines, noise reduction, speaker separation & recognition, emotional analysis, emotion detection and NLU / NLG components.

In the Product Background AI and ML drive fast, intelligent product rendering, stopping and quick release of information using improved pattern recognition, confusing detection and analysis of the root cause.

Uniphore technology stack includes standard plugins including CC infra, business applications, key technological components such as ASR, TTS, NLU, NLG, sound enhancement, sensory detection, sensory analysis. tools and ultimately the industry's best analytics and viewing platform as well as an omnichannel interface that includes IVR, mobile and web communications.

2) **Growth**: The last ten years can be divided into two phases in which the company itself is formed into what it is now. From its inception in 2008 to 2015 when it launched its first product, the launch was inspired by a mix of partnerships, equity, loans and seeds from IIT Madras and the team focused on in-depth technology to build a relevant algorithm

suitable for different dialects in India. They sustained for six years without any further support.

Moving on to the second phase, they switched to the B2B Company from the B2C system. they focus on selling their products rather than services. their flagship product, auMina, is a voice analysis product launched in early 2015 followed by akeira, a visual assistant and amVoice, a voice biometric software. They have now become market leaders in speech recognition technology especially in India and South East Asia and their US business looks bright.

Currently, they are a 150-member team that will, in the next few years, aim to rise to 1000, promising to be proud of their speech skills (ASR, speech signal processing, NLP), in-depth learning and full Java - stack experts.

The company has also been able to raise funds over the years where it has been able to retain its original investors and the rope for the people who have invested heavily in the company. Some of the key investors are IDG Ventures India, IIFL, India Angel Network, YourNest Angel Fund and Ray Stata.

They were growing rapidly in the APAC and North American markets. In addition, significant investments are needed in basic technologies, patents / IPR architecture and product development environments. Therefore funds will be used carefully to ensure that business, product development and innovation are properly invested. ensure ROI improvement for investors(analyticsindiamag, 2018).

Yellow.ai

The analysis of Yellow.ai performance has been categorised into two parts 1) Innovation and 2) Growth.

1) **Innovation**: Yellow.ai offers advanced services that provide critical distinctions, such as default purpose and business acquisition, reduced training data requirements, "human-in-the-loop support", and low code / no-code capability.

   Yellow.ai's unique approach to triple integration of NLP, ML, and AI to CX distinguishes it from competing vendors that offer only automation or human agents. Yellow.ai's

research and development arm, Bitonic Labs, is focused on solving long-term challenges for businesses looking to use chat AI on a large scale.

Yellow.ai's deep learning-based engine, developed on a transformer model, imports unstructured data, and automatically creates purpose. This model allows businesses to provide comprehensive search capabilities across all platforms without the need for personal training. It also offers a wide range of communication and advanced information management systems such as Microsoft Sharepoint, Servicenow, and Confluence, allowing businesses to use their knowledge base to get started faster than the competition. At the same time, its efficient NLP data model incorporates potential questions and situations and makes systematic data available for bot training. This NLP engine is based on a few short-learning model that delivers outstanding results with 50% less data.

Yellow.ai is a horizontal platform with pre-built language models in various industries. Yellow.ai is a unique industry and function-agnostic platform that supports any form of chat AI in all marketing, customer support, chat marketing, HR, and ITSM.

A company-like personal conversation and voice bots can understand past emotions, intentions, and behaviours; bots can also change tone, tone, joy and more, to meet customer needs. Yellow.ai bots learn differently from all human-generated questions in order to reduce future AI-to-human hand delivery quickly, gaining 60% automation in the first 30 days. This continuous improvement leads to further deviation from the right answers while keeping the person informed(economictimes, 2021).

2) **Growth** : Conversational CX automation platform, Yellow.ai has seen a sharp rise in customers during the epidemic. it has about 60% of its customers based in India and boasts brands such as Mi, Food Panda, Tata Motors, Bajaj Finserv, Byju's, Adani Capital, Sephora, Renault, Siemens among many others who have seen its customers try to cope with the disruption that was brought about by the epidemic. Before the start of the Covid-19, the company had about 100 customers. Over the past 18 months, they have seen customers grow from 100 to about 900.
   Companies have been able to successfully provide business continuity by allowing for flexibility in terms of dealing with a staff base, even with the slightest increase in support responsibilities. So that’s actually about the two visible assistants within the offices of these businesses. So these have been amazing drivers and have been a great force in the whole industry, and especially in yellow.ai as a company.
   The company has invested nearly $ 25 million in the development of the platform and will continue to invest in the same way to develop multilingual skills, voice and research skills and advances in natural language processing and compositional analytics.

Yellow.ai aims to enable transactions with their B2B customers where they can place orders on WhatsApp while also expanding the scope of engagement on WhatsApp so that they too can talk on the phone. So users can place orders by phone, and instead of people agents responding and taking orders, a visible helper can take orders and provide feedback to their end customers.

Bharat Petroleum Corporation Limited (BPCL) is among the company's customers. BPCL recently implemented an AI-based customer service solution called Urja, powered by Yellow.ai, in an effort to raise the level of customer experience for all (CX) by improving their CX automation platform to better engage customers, quickly and effectively (prnewswire, 2021).

Aisera

The analysis of Aisera performance has been categorised into two parts 1) Innovation and 2) Growth.

1) **Innovation**: Aisera offers the first practical, personal, and predictable industry AI Service Management (AISM) solution, which includes AI Service Desk, AI Customer Service and TicketIQ with Agent-Assist for B2B and B2C organizations . Encouraged by AI and machine learning, Aisera's AI solves automation, operations and IT workflows, Customer Service, Sales and Operations. It easily integrates with business applications such as Salesforce, Oracle, Zendesk, ServiceNow, Workday, Adobe, Atlassian, and BMC. Aisera gains a high-end end-to-end experience for its users, significantly reduces costs, and improves productivity for service providers, all while driving business revenue and growth.

   Aisera is the industry’s first AI Service Management (AISM) platform, automated desk and customer support solutions using single AI and cloud solutions. Using unlocked AI, Chat AI (or Visual Assistant) and AI capabilities in AI-enabled RPA Conversation, Aisera provides a single automatic, scalable interface that combines IT, HR, Resources, Marketing , Customer Service and Services. Organizations can now bring a sense of personalized customer service and directed to both employees and customers to get quicker self-help decisions. Aisera is a Gartner Cool vendor, known for its workflow and automated workflow through out-of-the-box IT Service Desk, Customer Support, ITSM and AIOps solutions that integrate seamlessly with existing business and consumer environments (prnewswire, 2020).
2) **Growth**: Aisera, the world's first AI-enabled platform for automated operations, actions and workflows for employees and customers, announced on April 21, 2021 that it has secured $ 40M funding in Series C round. The round was led by Icon Ventures, with the participation of a new investor World Innovation Lab and existing investors True

Ventures, Menlo Ventures, Norwest Venture Partners, Khosla Ventures, First Round Capital, Webb Investment Network, and Sherpalo. The company, now raising more than $ 90M in total, aims to invest heavily to continue the rapid growth and distribution of its AI-platform in the IT business, HR and customer service facilities, as well as significant progress in its strategic move towards market, marketing and product development.

The new funding comes at the time of Asera's rapid growth. In addition to achieving an annual growth of 300% and a base of more than 65 million users, the company has secured a number of new business customers including: 8 × 8, Autodesk, Dartmouth College, Dave, McAfee, NJ Transit, and Zoom. Aisera's rapid growth in partnerships has resulted in the company's access to Marketplace App and partners Microsoft, Salesforce, and ServiceNow. In addition, Aisera added new partnerships and integration with Zoom, Slack, and Microsoft Teams that empower and enhance corporate customer engagement, while enhancing corporate growth (Aisera, 2021).

Hugging Face

The analysis of Aisera performance has been categorised into two parts 1) Innovation and 2) Growth.

1) **Innovation**: Hugging Face's first tour has been a phenomenal. The company, which started out as a chatbot, gained a lot of attention in the industry in a very short time; Big companies like Apple, Monzo, and Bing use their libraries in production. The Hugging Face converter library is supported by PyTorch and TensorFlow, and offers thousands of pre-trained models for functions such as text editing, summarizing, and retrieving information.

   In September last year, the company released Datasets, a contemporary NLP public library, containing 650 different data sets and more than 250 contributors. With Datasets, the company aims to measure the end user interface, translation, and documentation. This is in line with the company's vision for a democratic AI, which can expand the benefits of emerging technologies into smaller technologies, focusing on a few powerful hands (analyticsindiamag, 2022).
2) **Growth**: huggingface has Raised the $ 40 billion Series B funding round. The company has been building an open source library of natural language processing technology (NLP). one can find the Transformers library on GitHub - it has 42,000 stars and 10,000 forks.Existing investors Lux Capital, A.Capital and Betaworks also took part in the fundraising round of 11 March 2021.
   With Transformers, one can use popular NLP models, such as BERT, GPT, XLNet, T5 or DistilBERT and use those models to convert text in one way or another. For example,

a person can split text, extract information, answer questions automatically, summarize text, generate text, etc.

There are many different ways to use NLP. The most popular has been the support chatbot. For example, the challanger bank Monzo used Hugging Face behind the scenes to answer questions from its customers. In all, about 5,000 companies use Hugging Face in some way, including Microsoft with its own Bing search engine.

When it comes to business model, startup has recently introduced a way to get essential support, manage confidential models and handle the targeting API for anyone in need. Clients include Bloomberg and Typeform.

With the new revenue cycle, the company plans to double its value in New York and Paris - there will be far-reaching positions again. Interestingly, the company also shares certain details with its bank account.

Hugging Face had a good cash flow in January and February 2021. The company made a $ 15 million round over the same period last year - 90% of the previous round is still available in a bank account. And the company's rating has seen a five-fold increase. This should not be surprising because one can negotiate better terms if one does not really need to raise.

And it looks like Hugging Face is on the right track as the company handles a living community of NLP developers. One can browse the models and sets of data, take advantage of them and contribute as Face Hugging becomes the central brick for NLP lovers(techcrunch, 2021).

HiMarley

The analysis of HiMarley performance has been categorised into two parts 1) Innovation and 2) Growth.

1) **Innovation**: Hi Marley is a platform for applications, APIs and a layer of intelligence that integrates with other important programs such as Guidewire and Duck Creek "to bring sensitive information" to carriers.

   Marley Insights is a visual dashboard of more than 20 built-in analytical reports, as well as many customized views that include message sentiment, open claims, average initial contact time, survey result rating, active users, and case status. Managers can filter through multiple attributes that include case type, group, username and date and status, and insurers can use the provided API to integrate data from Marley Insights into their centralized insurance area.

   Hi Marley defines its overall coverage as making it easier for policymakers to contact the claim adjusters in writing to improve their preferred communication channels to eliminate inefficiencies. By providing an SMS platform aimed at the insurance industry to which

the entire ecosystem of service providers can communicate, insurance carriers can delight customers, get faster settlement time and lower loss rates (iireporter, 2021).

2) **Growth**: Hi Marley, creators of the only smart communication platform built for the the insurance industry by people who know insurance, announced on March 11, 2022 that the company has closed its $ 25 million Series B funding roundup. The investment was led by Emergence Capital, with Founder and Partner General Gordon Ritter taking over the Hi Marley Board. Returning firms Underscore, True Ventures, Bain Capital Ventures and Greenspring also participated in this cycle, as well as additional investors including Brewer Lane Ventures (himarley, 2021).

   The need is there, and undoubtedly the COVID-19 epidemic that is forcing more and more people to go digital has led to more consumer demand for new means of communication. Last year, the number of carriers using the Hi Marley platform doubled, and the company saw a 4x increase in its user base. Currently, the launch has more than 40 customers live in production - including American Family, MetLife, Auto-Owners, Erie and MAPFRE.

   Emergence Capital led the Series B round, bringing the total value of Hi Marley since its inception in 2017 to $ 41.7 million. Existing sponsors are Underscore, True Ventures, Bain Capital Ventures, and Greenspring also contributed to the funding, as well as additional investors including Brewer Lane (techcrunch, 2021).

3.3 Research Question 3

What are typical investors of Conversational AI leading companies according to open datasets (which type of investor and on what stage of funding)?

Table 3.

S.No	Company	Category	Product Focus Area	Country	Select Investors
1	Uniphore	conversationalAI	transformational customer service	India	400 Million series E funding , NEA, March capital
2	Aisera	conversationalAI	IT, HR, customer service, facilities, and cloud operations.	USA	40M seriec C funding Icon ventures

3	Hugging Face	social AI	chit-chat, talks sassy, and trades selfies with users.	France	40M series B round funding Lux capital
4	Dialogflow	conversationalAI	speech recognition and NLP	USA	3M series C Siac venture capital
5	Hi Marley	conversationalAI	SMS texting platform	USA	25 Million Series B round funding true ventures and bian capital ventures
6	Rasa	conversationalAI	contextual assistants	USA	26 Million series B led by A16Z
7	Pypestream	customer engagement solution	pragmatic AI and chatbots	USA	4.6M Series unknown
8	PolyAI	conversationalAI	machine learning platform	UK	14M Series B round led by khosla ventures
9	Voicebox Technologies	conversational AI	ASR, NLU, and TTS apps	USA	acquired by nuance communication for undisclosed amount
10	Avaamo	conversational AI	Deep learning software	India	14.2 series A funding led by intel capital
11	yellow.ai	Enterprise AI channel	customer Engagement	India	78.15 M series C round led by westbridge capital, sapphire ventures, salesforce venture and lightspeed venture partners
12	Semantic Machines	conversational AI	Ecommerce, social networks , productivity software	USA	microsoft acquired semantics.
13	orbita	conversational AI	Voice first	USA	9M series A finding by philips health technology ventures and healthx ventures
14	Level AI	conversational AI	costomer experience	USA	20 M in series B funding led by battery venture, eniac and village global
15	haptik.ai	conversational AI	intelligent virual assistant	India	100M with 87% stake by reliance industries limited

16	Kea	conversatioanl AI	customer Engagement	USA	10M series A led by marbruck
17	Clinc	conversational AI	personal financial assistant, mobile voice activated	USA	52M series B funding by insigh partenrs, DJF growth,drive capital, hyde park venture partners
18	Apprente	conversational AI	vocie based personal assistant	USA	mcdonald acquires apprente
19	Aktify	conversational AI	conversational collective intelligence	USA	total 4.5 million seed round by shawn cox and creg peeler
20	kore.ai	conversational AI	conversational solutions	USA	50M seriec C funding led by vistara growth and PNC
21	VoiceStar.ai	conversational AI	voice and ai technology for food service	USA	250K Seed round
22	Eloquent labs	conversational AI	Chatbots	USA	square acquired eloquent labs
23	botanic.io	conversational AI	conversational interfaces and avatars	USA	undisclosed seed fund by outlier ventures
24	Discovery AI	conversational AI	AI led customer success	India	acquired by talkwalker
25	REZO.ai	conversational AI	instant resolution	India	undisclosed amount of seed funding by modulor capital, dexter angel network, veda
26	AskSid ai	conversational AI	Ai solution for retail and consumer goods industry	India	raised $120,000 / Pre Seed from Techstars and Techstars Hub71
27	saarthi.ai	conversational AI	multilingual conversational enterprise AI	India	undislosed seed funding from leads angel network
28	GenieTalk	conversational AI	virtual assistant	India	raises 750K from shankeswar technologies llp
29	senseforth ai	conversational AI	AI powered bot	India	14M led by Fractal

30	the chatmate	conversational AI	chat platform	India	NA
31	Manthan	conversational AI	business assistant	India	undisclosed amount venture round by innoven capital
32	bash.ai	conversational AI	Chatbots	India	NA
33	Gi Labs	conversational AI	voice and chat enabled virtual assistant	India	NA
34	reverie technologies	conversational AI	voice assistant for non english speaker	India	acquired by reliance industries

From the table, obtained from self-created datasets from open source information we can say below that:

1) The typical investor for uniphore are NEA and March capital. NEA is a global venture capital with a mission to make the world better by helping founders build great companies. March capital is a top tier venture capital firm headquartered in santa monica California and investing globally since 2014. Both the venture capital has funded uniphore with 400M USD with series E round of funding [49; 50].
2) Icon Ventures is a Silicon Valley-based firm that specializes in Series B and C financings in tech sectors such as cloud and data, security, digital health and other areas of IT investing. They lead financings for extraordinary early-stage companies, co-investing alongside the world's leading venture firms (iconventure, 2022). Aisera has been funded by Icon ventures with 40M USD series C round of Funding.
3) Lux Capital invests in emerging science and technology enterprises on the outside edge of what is possible. They are working with iconoclastic founders who are challenging the state of nature and the laws of nature to make their ideas for the future become alive.(luxcapital,2022) lux capital invested 40M USD in hugging face in series B round of funding.
4) SAIC Capital is a corporate venture capital firm formed in 2014. Its purpose is to establish SAIC as a major player in developing leading-edge technology for the transportation industry. Areas of investment include: Alternative energy solutions, Durable, lighter materials, Human Machine Interaction (HMI), Autonomous driving, Connected Vehicles (IoT), Energy, Fuel and powertrain and Big Data (saicvc, 2022). SIAC capital invested in dialogflow 3M USD series C round of Funding.
5) True venture is a Silicon Valley-based venture capital firm focused on early stage technology startups. They invest in brilliant people who bring ideas that matter to life (trueventures, 2022). Bain Capital Ventures LLC is the venture capital division within Bain Capital, which has approximately $105 billion of assets under management worldwide (Wikipedia, 2022). True ventures and Bian capital ventures invested in Hi Marley 25M USD series B round of funding.

6) Andreessen Horowitz (a16z) is a venture capital firm in Silicon Valley, California, that backs bold entrepreneurs building the future through technology (A16Z, 2022). Andreessen Horowitz has invested 26M USD in series B round of funding.
7) Pypestream is funded by 12 investors. W. R. Berkley and The Chatterjee Group are the most recent investors(crunchbase, 2022). Pypestream has received investment of 4.6 Million USD with series unknown round of funding.
8) Khosla Ventures is an American venture capital firm founded by Vinod Khosla, focused on early-stage companies in the Internet, computing, mobile, silicon technology, biotechnology, healthcare and clean technology sectors (Wikipedia, 2022). Khosla ventures has invested in polyAI with 14M USD serieb B round of funding .
9) Voicebox Technologies was acquired by Nuance Communications on May 19, 2018 .
10) Intel Capital is part of Intel Corporation, designed to manage business finance, global investment, consolidation and acquisition(intelcapital, 2022). Intel capital invested in avaamo with 14.2 M USD series A round of funding.
11) WestBridge Capital is an investment firm with a strong focus on investment in India. WestBridge seeks to collaborate with some of India's most promising middle-income companies run by prominent businessmen and long-term management teams, whether public or private (linkedin, 2022). Sapphire Ventures, LLC is a commercial finance firm with offices in Austin, California, Palo Alto, London and San Francisco. Sapphire invests in Series B through IPO technology companies, as well as technology-focused firms, seeds, and emerging sports start-ups for Series A (Wikipedia, 2022). Salesforce's investment arm is focused on creating the world's largest ecosystem for business cloud companies. Since 2009, they have formed partnerships and helped accelerate growth in the implementation of more than 400 technologies (salesforce, 2022). Lightspeed Venture Partners is a global company focused on multi-sectoral investments in business, consumer and health technologies. For the past two decades, the company has supported companies such as Snapchat, Affirm, MuleSoft, and AppDynamics (lsvp, 2022).they have invested 78.15M USD in series C round of funding.
12) Microsoft acquired Semantic machines (blogs.microsoft, 2018).
13) Founded in 2017, the Philips Health Technology Venture Fund is a Royal Philips business fund based in Amsterdam, Netherlands. A business-agnostic fund that invests with, and collaborates with, promising healthcare companies and healthcare technology services to accelerate their growth and expand their reach, and to drive shared digital transformation in health care. The fund is owned by Philips Ventures, an outside innovation Philips group. As a leading healthcare technology company, Philips focuses on improving people's health and allowing better outcomes across health continuity from a healthy lifestyle and prevention, diagnosis, treatment and home care (philips, 2022). HealthX Ventures is a venture capital digital healthcare-focused firm. We invest in innovative companies making healthcare safer, more efficient, and more affordable by delivering easy-to-use, cost-effective, and scalable solutions to the market (battery.com, 2022). They invested in orbita a sum of 9 Million USD in series A round of funding.
14) Battery Ventures is an investment firm focused on American technology. Founded in 1983, the company makes large-scale and equity-based investments in global markets from offices in Boston, Silicon Valley, San Francisco, Israel and London (battery.com, 2022).

Authentic. Bold. Curious. ENIAC leads seed cycles to courageous innovators who use code to build transformative companies (Wikipedia, 2022). Village Global is the first fundraising firm supported by some of the world's most successful entrepreneurs. Village is not a traditional VC. They are a network (linkedin, 2022). They have invested in Level AI 20M USD in series B round of funding.

15) Marbruck Investments is an open-ended venture capital group. They selectively invest in companies at the cutting-edge of technology (marbruck, 2022). Marbruck invested 10M USD in Kea with series A round of funding.

Summary

In this Chapter we analysed the data from SLRs and data obtained from open datasets. The key findings are the United States of America comes on top of 2020 year's index with five top positions to Western European countries (UK, Finland, Germany and Sweden). All this countries get high scores on all three pillars of the Index: government, technology sector and data and infrastructure. Four out of the top five just published the national AI strategies that have gone by 2020, and the US introduced American AI initiative in late 2019. The analysed the performance of top 5 leading conversational AI companies Uniphore, yellow.ai, Aisera, Hugging Face, Hi Marley. At the End the third research question we found the typical investors of conversational AI companies, type of investor and stage of funding based on open datasets.

Conclusion

This Chapter is the final part of the master thesis and contains the main conclusions of the work. During the research, we got acquainted with the main conversational AI leading countries and leading companies. In order to successfully complete the research tasks and be able to draw conclusions, we used the literature review and analysis of open datasets as the main method of our research. This work also presented a systematic literature review about the use of conversational agents in business domains. The work answered three focused research question based on a selected literature corpus and analysing the open datasets. The corpus was created through the search of articles in research databases, with inclusion and exclusion criteria followed by filtering steps. Each article of the corpus was used in one way or other to analyse or draw conclusions to build ground to answer the proposed research questions. The research questions covered the business domains that received studies and described primary goals and future challenges. The selected literature corpus and analysing the open datasets it is understood that the AI standards and AI readiness index is important to understand when it comes to determine which country is leading in conversational AI. It is not necessarily that the country leading in Artificial Intelligence overall will also lead in conversational AI Except the case of United States of America. AI readiness Index 2020 shows the top leading AI countries are USA, UK, Finland, Germany and Sweden but excluding United States of America none of the countries from top five are leading in conversational AI. India is the leading country in conversational AI with several conversational AI companies and startups are leading either in India or headquartered in USA with India operations. In addition to providing unique opportunities, India provides a complete "playground" for businesses and institutions around the world to develop solutions that can be easily used in all developing countries and economies. Simply put, Resolving India means resolving 40% of the world's AI garage. India's strengths in IT combined with opportunities, provide much needed impetus to find uncontrollable solutions to customer service problems, and developing chatbots and voice assistant. Coming to the findings of second research questions there are several conversational AI leading companies in India and USA out which the Uniphore a leading Conversational AI company tops the list with 2.5 billion market valuation. The analysis of performance of top 5 leading conversational AI companies is categorized in two parts first is innovation and second is growth of the company .Third research question explains the type of investors and round of funding they have done in companies leading in conversational AI technologies where NEA and march capital tops the list by investing 400M USD in uniphore.

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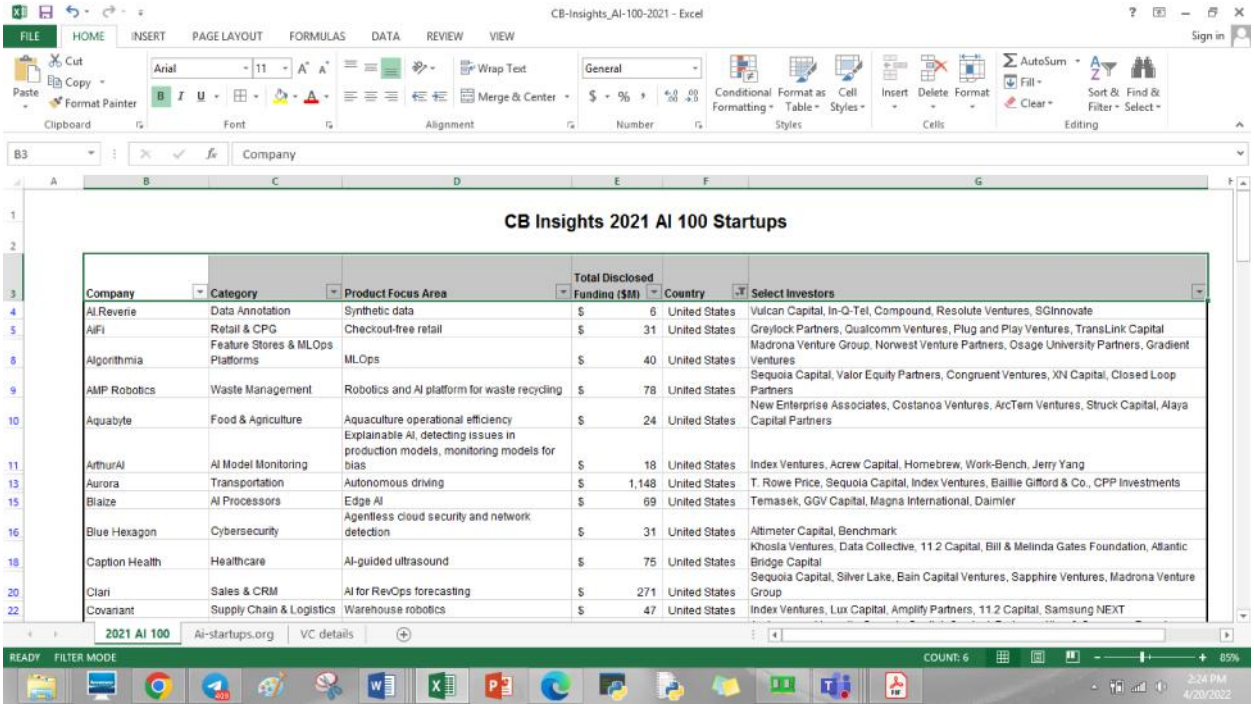
APPENDIX

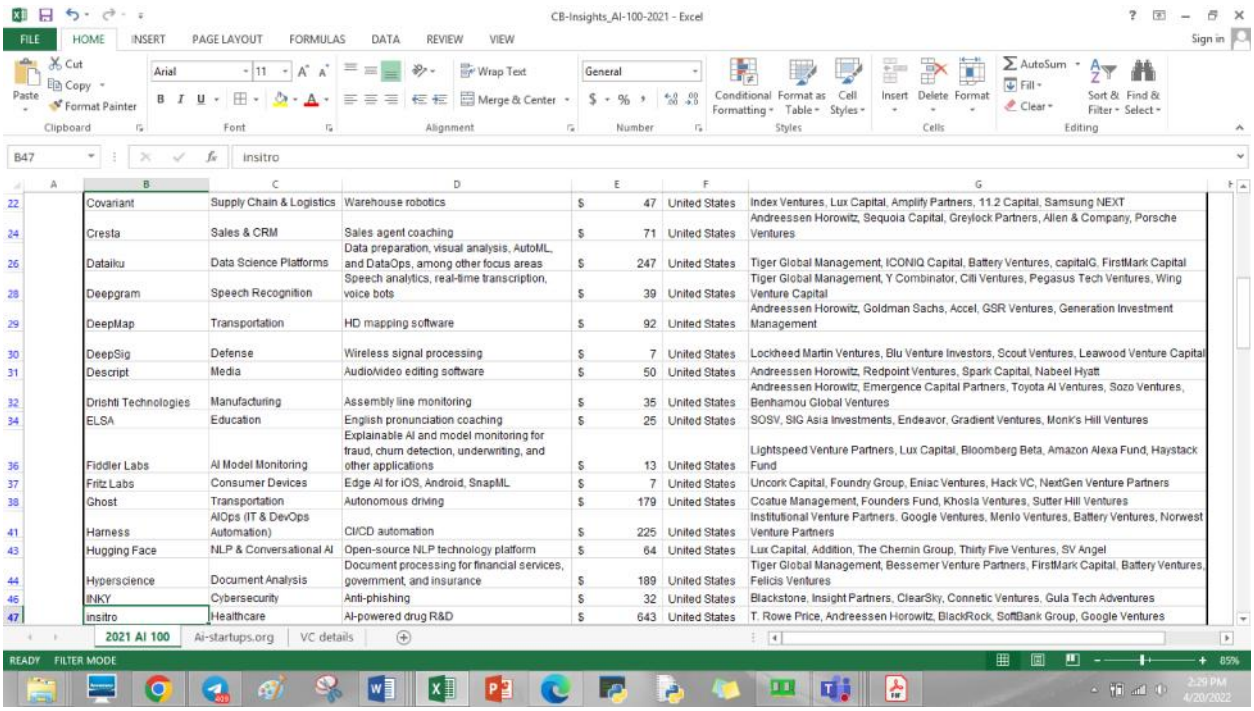
CB Insights top 100 AI



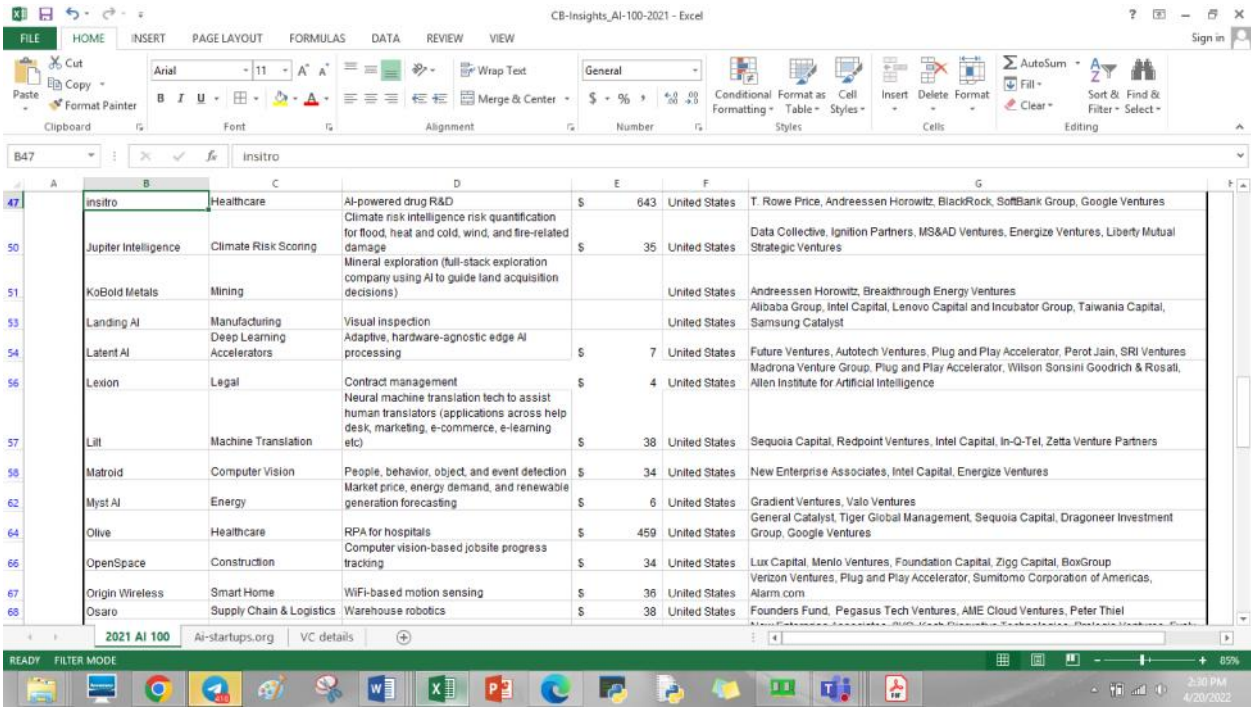
CB-Insights_AI-100-2021 - Excel

CB Insights 2021 AI 100 Startups

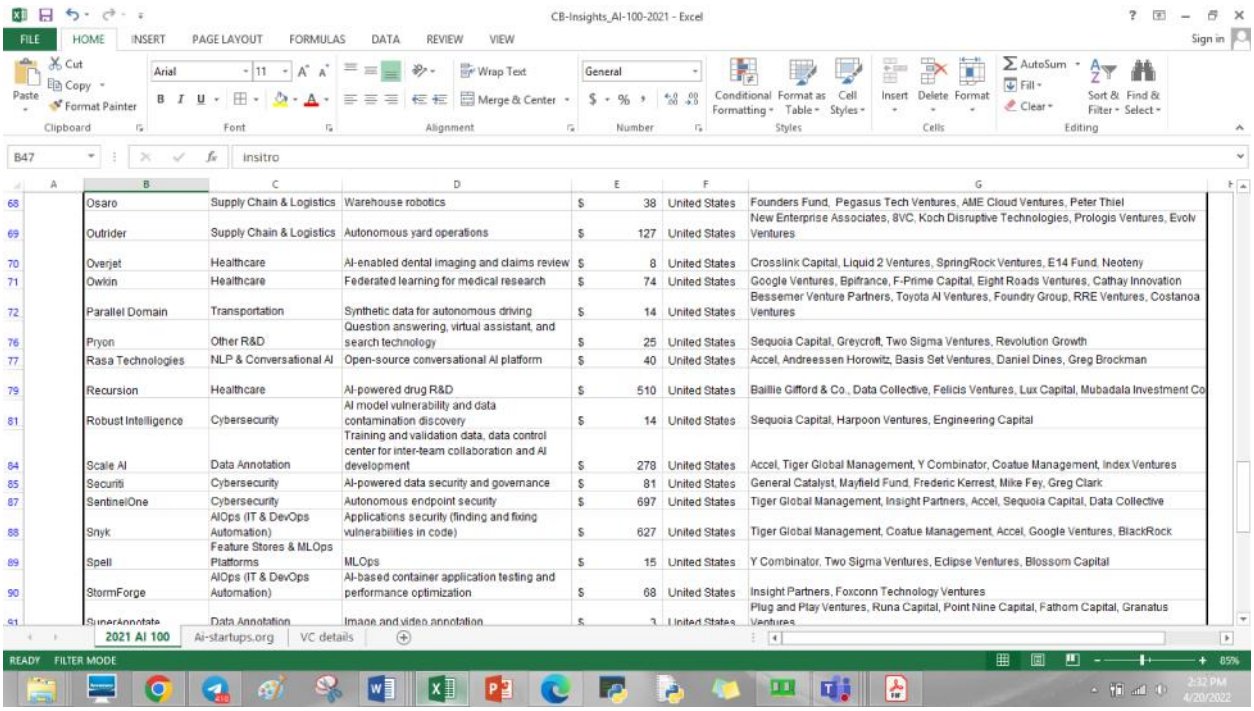
Company	Category	Product Focus Area	Total Disclosed Funding ($M)	Country	Select Investors
AI.Reverie	Data Annotation	Synthetic data	$ 6	United States	Vulcan Capital, In-Q-Tel, Compound, Resolute Ventures, SGInnovate
AiFi	Retail & CPG	Checkout-free retail	$ 31	United States	Greylock Partners, Qualcomm Ventures, Plug and Play Ventures, TransLink Capital
Algorithmia	Feature Stores & MLOps Platforms	MLOps	$ 40	United States	Madrona Venture Group, Norwest Venture Partners, Osage University Partners, Gradient Ventures
AMP Robotics	Waste Management	Robotics and AI platform for waste recycling	$ 78	United States	Sequoia Capital, Valor Equity Partners, Congruent Ventures, XN Capital, Closed Loop Partners
Aquabyte	Food & Agriculture	Aquaculture operational efficiency	$ 24	United States	New Enterprise Associates, Costanoa Ventures, ArcTern Ventures, Struck Capital, Alaya Capital Partners
ArthurAI	AI Model Monitoring	Explainable AI, detecting issues in production models, monitoring models for bias	$ 18	United States	Index Ventures, Acrew Capital, Homebrew, Work-Bench, Jerry Yang
Aurora	Transportation	Autonomous driving	$ 1,148	United States	T. Rowe Price, Sequoia Capital, Index Ventures, Baillie Gifford & Co., CPP Investments
Blaize	AI Processors	Edge AI	$ 69	United States	Temasek, GGV Capital, Magna International, Daimler
Blue Hexagon	Cybersecurity	Agentless cloud security and network detection	$ 31	United States	Altimeter Capital, Benchmark
Caption Health	Healthcare	AI-guided ultrasound	$ 75	United States	Khosla Ventures, Data Collective, 11.2 Capital, Bill & Melinda Gates Foundation, Atlantic Bridge Capital
Clari	Sales & CRM	AI for RevOps forecasting	$ 271	United States	Sequoia Capital, Silver Lake, Bain Capital Ventures, Sapphire Ventures, Madrona Venture Group
Covariant	Supply Chain & Logistics	Warehouse robotics	$ 47	United States	Index Ventures, Lux Capital, Amplify Partners, 11.2 Capital, Samsung NEXT



	A	B	C	D	E	F	G
22		Covariant	Supply Chain & Logistics	Warehouse robotics	$ 47	United States	Index Ventures, Lux Capital, Amplify Partners, 11.2 Capital, Samsung NEXT
24		Cresta	Sales & CRM	Sales agent coaching	$ 71	United States	Andreessen Horowitz, Sequoia Capital, Greylock Partners, Allen & Company, Porsche Ventures
26		Dataiku	Data Science Platforms	Data preparation, visual analysis, AutoML, and DataOps, among other focus areas	$ 247	United States	Tiger Global Management, ICONIQ Capital, Battery Ventures, capitalG, FirstMark Capital
28		Deepgram	Speech Recognition	Speech analytics, real-time transcription, voice bots	$ 39	United States	Tiger Global Management, Y Combinator, Citi Ventures, Pegasus Tech Ventures, Wing Venture Capital
29		DeepMap	Transportation	HD mapping software	$ 92	United States	Andreessen Horowitz, Goldman Sachs, Accel, GSR Ventures, Generation Investment Management
30		DeepSig	Defense	Wireless signal processing	$ 7	United States	Lockheed Martin Ventures, Blu Venture Investors, Scout Ventures, Leawood Venture Capital
31		Descript	Media	Audio/video editing software	$ 50	United States	Andreessen Horowitz, Redpoint Ventures, Spark Capital, Nabeel Hyatt
32		Drishti Technologies	Manufacturing	Assembly line monitoring	$ 35	United States	Andreessen Horowitz, Emergence Capital Partners, Toyota AI Ventures, Sozo Ventures, Benhamou Global Ventures
34		ELSA	Education	English pronunciation coaching	$ 25	United States	SOSV, SIG Asia Investments, Endeavor, Gradient Ventures, Monk's Hill Ventures
36		Fiddler Labs	AI Model Monitoring	Explainable AI and model monitoring for fraud, churn detection, underwriting, and other applications	$ 13	United States	Lightspeed Venture Partners, Lux Capital, Bloomberg Beta, Amazon Alexa Fund, Haystack Fund
37		Fritz Labs	Consumer Devices	Edge AI for iOS, Android, SnapML	$ 7	United States	Uncork Capital, Foundry Group, Eniac Ventures, Hack VC, NextGen Venture Partners
38		Ghost	Transportation	Autonomous driving	$ 179	United States	Coatue Management, Founders Fund, Khosla Ventures, Sutter Hill Ventures
41		Harness	AIOps (IT & DevOps Automation)	CI/CD automation	$ 225	United States	Institutional Venture Partners, Google Ventures, Menlo Ventures, Battery Ventures, Norwest Venture Partners
43		Hugging Face	NLP & Conversational AI	Open-source NLP technology platform	$ 64	United States	Lux Capital, Addition, The Chernin Group, Thirty Five Ventures, SV Angel
44		Hyperscience	Document Analysis	Document processing for financial services, government, and insurance	$ 189	United States	Tiger Global Management, Bessemer Venture Partners, FirstMark Capital, Battery Ventures, Felicis Ventures
46		INKY	Cybersecurity	Anti-phishing	$ 32	United States	Blackstone, Insight Partners, ClearSky, Connetic Ventures, Gula Tech Adventures
47		insitro	Healthcare	AI-powered drug R&D	$ 643	United States	T. Rowe Price, Andreessen Horowitz, BlackRock, SoftBank Group, Google Ventures



	A	B	C	D	E	F	G
47		insitro	Healthcare	AI-powered drug R&D	$ 643	United States	T. Rowe Price, Andreessen Horowitz, BlackRock, SoftBank Group, Google Ventures
50		Jupiter Intelligence	Climate Risk Scoring	Climate risk intelligence risk quantification for flood, heat and cold, wind, and fire-related damage	$ 35	United States	Data Collective, Ignition Partners, MS&AD Ventures, Energize Ventures, Liberty Mutual Strategic Ventures
51		KoBold Metals	Mining	Mineral exploration (full-stack exploration company using AI to guide land acquisition decisions)		United States	Andreessen Horowitz, Breakthrough Energy Ventures
53		Landing AI	Manufacturing	Visual inspection		United States	Alibaba Group, Intel Capital, Lenovo Capital and Incubator Group, Taiwania Capital, Samsung Catalyst
54		Latent AI	Deep Learning Accelerators	Adaptive, hardware-agnostic edge AI processing	$ 7	United States	Future Ventures, Autotech Ventures, Plug and Play Accelerator, Perot Jain, SRI Ventures
56		Lexion	Legal	Contract management	$ 4	United States	Madrona Venture Group, Plug and Play Accelerator, Wilson Sonsini Goodrich & Rosati, Allen Institute for Artificial Intelligence
57		Lilt	Machine Translation	Neural machine translation tech to assist human translators (applications across help desk, marketing, e-commerce, e-learning etc)	$ 38	United States	Sequoia Capital, Redpoint Ventures, Intel Capital, In-Q-Tel, Zetta Venture Partners
58		Matroid	Computer Vision	People, behavior, object, and event detection	$ 34	United States	New Enterprise Associates, Intel Capital, Energize Ventures
62		Myst AI	Energy	Market price, energy demand, and renewable generation forecasting	$ 6	United States	Gradient Ventures, Valo Ventures
64		Olive	Healthcare	RPA for hospitals	$ 459	United States	General Catalyst, Tiger Global Management, Sequoia Capital, Dragoneer Investment Group, Google Ventures
66		OpenSpace	Construction	Computer vision-based jobsite progress tracking	$ 34	United States	Lux Capital, Menlo Ventures, Foundation Capital, Zigg Capital, BoxGroup
67		Origin Wireless	Smart Home	WiFi-based motion sensing	$ 36	United States	Verizon Ventures, Plug and Play Accelerator, Sumitomo Corporation of Americas, Alarm.com
68		Osaro	Supply Chain & Logistics	Warehouse robotics	$ 38	United States	Founders Fund, Pegasus Tech Ventures, AME Cloud Ventures, Peter Thiel



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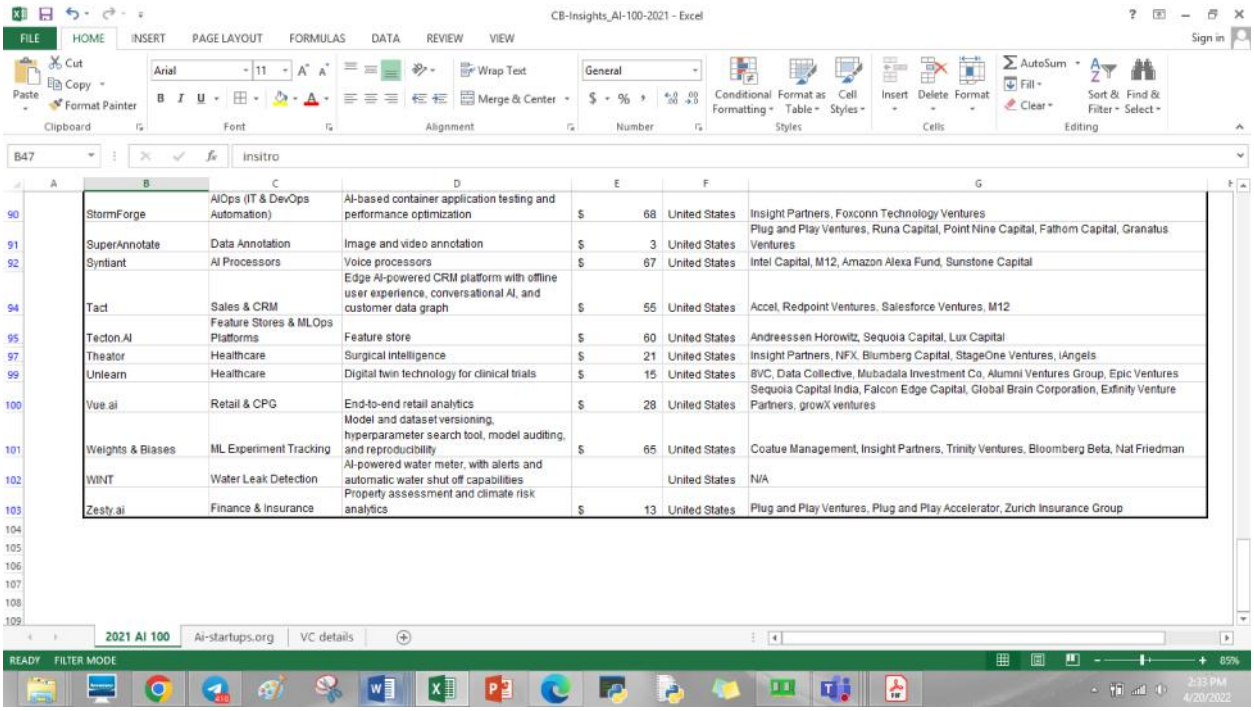
68	Osaro	Supply Chain & Logistics	Warehouse robotics	$ 38	United States	Founders Fund, Pegasus Tech Ventures, AME Cloud Ventures, Peter Thiel
69	Outrider	Supply Chain & Logistics	Autonomous yard operations	$ 127	United States	New Enterprise Associates, 8VC, Koch Disruptive Technologies, Prologis Ventures, Evolv Ventures
70	Overjet	Healthcare	AI-enabled dental imaging and claims review	$ 8	United States	Crosslink Capital, Liquid 2 Ventures, SpringRock Ventures, E14 Fund, Neoteny
71	Owkin	Healthcare	Federated learning for medical research	$ 74	United States	Google Ventures, Bpifrance, F-Prime Capital, Eight Roads Ventures, Cathay Innovation
72	Parallel Domain	Transportation	Synthetic data for autonomous driving	$ 14	United States	Bessemer Venture Partners, Toyota AI Ventures, Foundry Group, RRE Ventures, Costanoa Ventures
76	Pryon	Other R&D	Question answering, virtual assistant, and search technology	$ 25	United States	Sequoia Capital, Greycroft, Two Sigma Ventures, Revolution Growth
77	Rasa Technologies	NLP & Conversational AI	Open-source conversational AI platform	$ 40	United States	Accel, Andreessen Horowitz, Basis Set Ventures, Daniel Dines, Greg Brockman
79	Recursion	Healthcare	AI-powered drug R&D	$ 510	United States	Baillie Gifford & Co., Data Collective, Felicis Ventures, Lux Capital, Mubadala Investment Co
81	Robust Intelligence	Cybersecurity	AI model vulnerability and data contamination discovery	$ 14	United States	Sequoia Capital, Harpoon Ventures, Engineering Capital
84	Scale AI	Data Annotation	Training and validation data, data control center for inter-team collaboration and AI development	$ 278	United States	Accel, Tiger Global Management, Y Combinator, Coatue Management, Index Ventures
85	Securiti	Cybersecurity	AI-powered data security and governance	$ 81	United States	General Catalyst, Mayfield Fund, Frederic Kerrest, Mike Fey, Greg Clark
87	SentinelOne	Cybersecurity	Autonomous endpoint security	$ 697	United States	Tiger Global Management, Insight Partners, Accel, Sequoia Capital, Data Collective
88	Snyk	AIOps (IT & DevOps Automation)	Applications security (finding and fixing vulnerabilities in code)	$ 627	United States	Tiger Global Management, Coatue Management, Accel, Google Ventures, BlackRock
89	Spell	Feature Stores & MLOps Platforms	MLOps	$ 15	United States	Y Combinator, Two Sigma Ventures, Eclipse Ventures, Blossom Capital
90	StormForge	AIOps (IT & DevOps Automation)	AI-based container application testing and performance optimization	$ 68	United States	Insight Partners, Foxconn Technology Ventures
91	SuperAnnotate	Data Annotation	Image and video annotation	$ 3	United States	Plug and Play Ventures, Runa Capital, Point Nine Capital, Fathom Capital, Granatus Ventures



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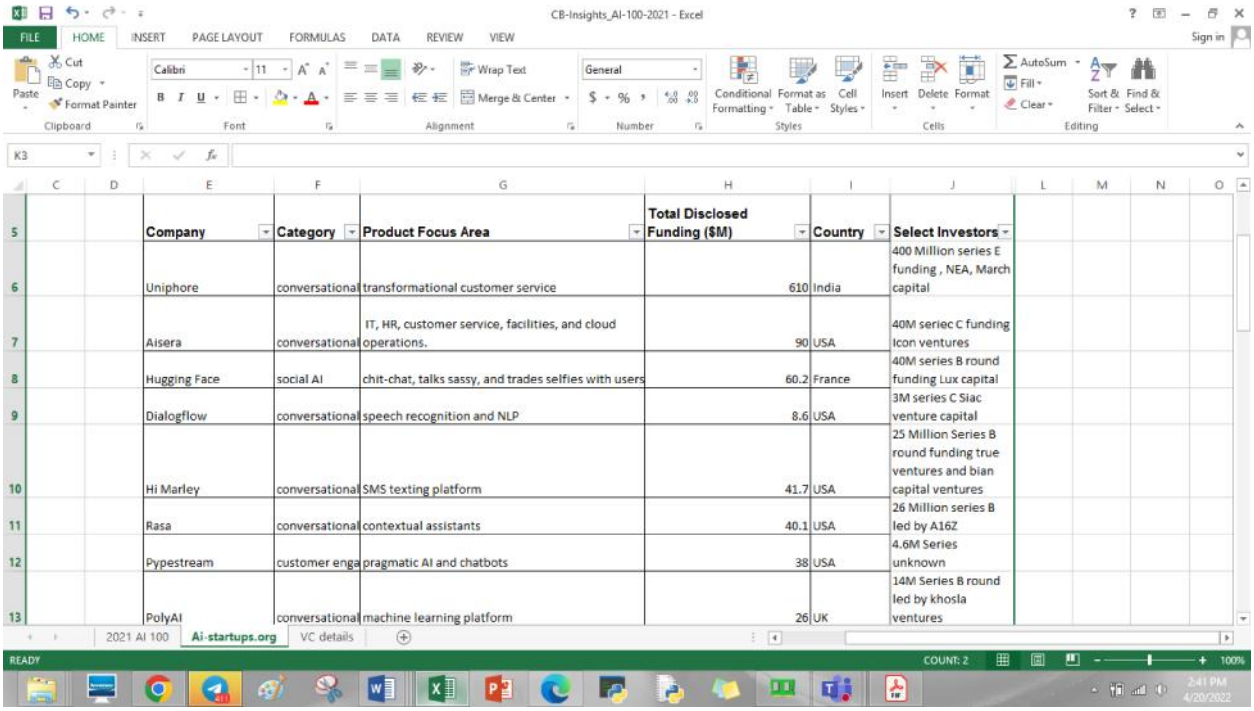
91	SuperAnnotate	Data Annotation	Image and video annotation	$ 3	United States	Plug and Play Ventures, Runa Capital, Point Nine Capital, Fathom Capital, Granatus Ventures
92	Syntiant	AI Processors	Voice processors	$ 67	United States	Intel Capital, M12, Amazon Alexa Fund, Sunstone Capital
94	Tact	Sales & CRM	Edge AI-powered CRM platform with offline user experience, conversational AI, and customer data graph	$ 55	United States	Accel, Redpoint Ventures, Salesforce Ventures, M12
95	Tecton.AI	Feature Stores & MLOps Platforms	Feature store	$ 60	United States	Andreessen Horowitz, Sequoia Capital, Lux Capital
97	Theator	Healthcare	Surgical intelligence	$ 21	United States	Insight Partners, NFX, Blumberg Capital, StageOne Ventures, iAngels
99	Unlearn	Healthcare	Digital twin technology for clinical trials	$ 15	United States	8VC, Data Collective, Mubadala Investment Co, Alumni Ventures Group, Epic Ventures
100	Vue.ai	Retail & CPG	End-to-end retail analytics	$ 28	United States	Sequoia Capital India, Falcon Edge Capital, Global Brain Corporation, Exfinity Venture Partners, growX ventures
101	Weights & Biases	ML Experiment Tracking	Model and dataset versioning, hyperparameter search tool, model auditing, and reproducibility	$ 65	United States	Coatue Management, Insight Partners, Trinity Ventures, Bloomberg Beta, Nat Friedman
102	WINT	Water Leak Detection	AI-powered water meter, with alerts and automatic water shut off capabilities		United States	N/A
103	Zesty.ai	Finance & Insurance	Property assessment and climate risk analytics	$ 13	United States	Plug and Play Ventures, Plug and Play Accelerator, Zurich Insurance Group

AI startups top 50 conversational AI companies



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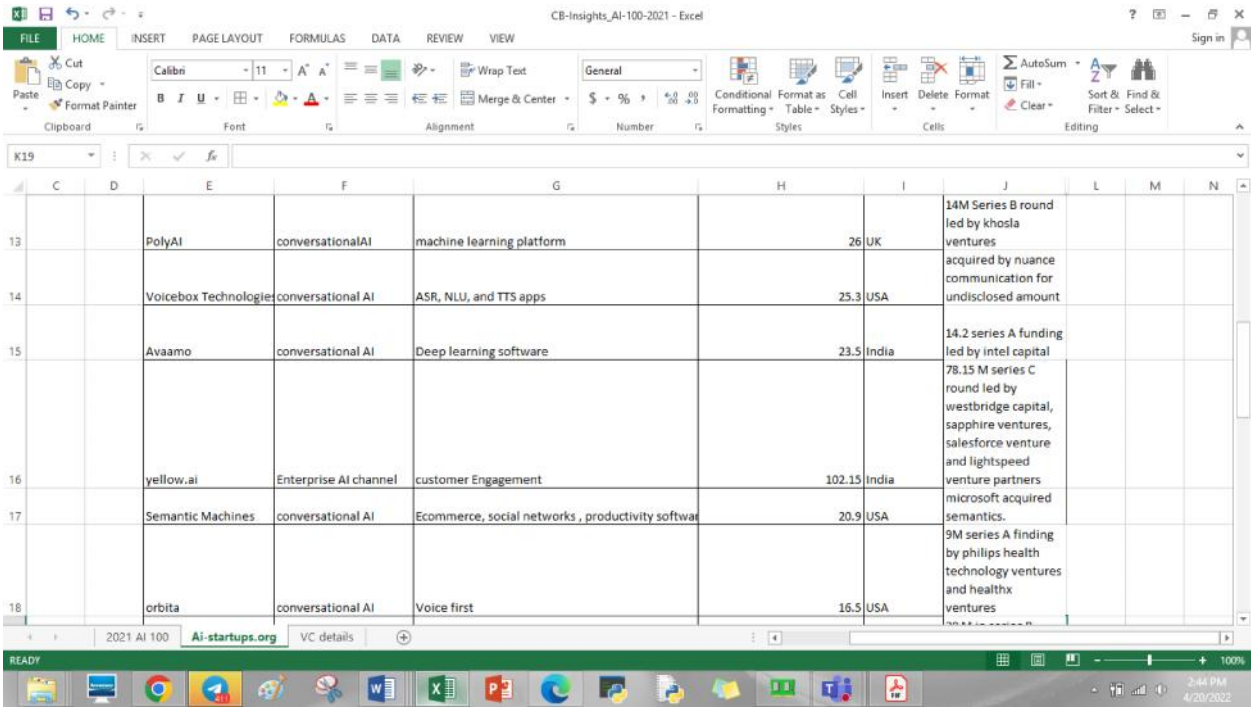
	Company	Category	Product Focus Area	Total Disclosed Funding ($M)	Country	Select Investors
6	Uniphore	conversational	transformational customer service	610	India	400 Million series E funding , NEA, March capital
7	Aisera	conversational	IT, HR, customer service, facilities, and cloud operations.	90	USA	40M seriec C funding Icon ventures
8	Hugging Face	social AI	chit-chat, talks sassy, and trades selfies with users	60.2	France	40M series B round funding Lux capital
9	Dialogflow	conversational	speech recognition and NLP	8.6	USA	3M series C Siac venture capital
10	Hi Marley	conversational	SMS texting platform	41.7	USA	25 Million Series B round funding true ventures and bian capital ventures
11	Rasa	conversational	contextual assistants	40.1	USA	26 Million series B led by A16Z
12	Pypestream	customer enga	pragmatic AI and chatbots	38	USA	4.6M Series unknown
13	PolyAI	conversational	machine learning platform	26	UK	14M Series B round led by khosla ventures



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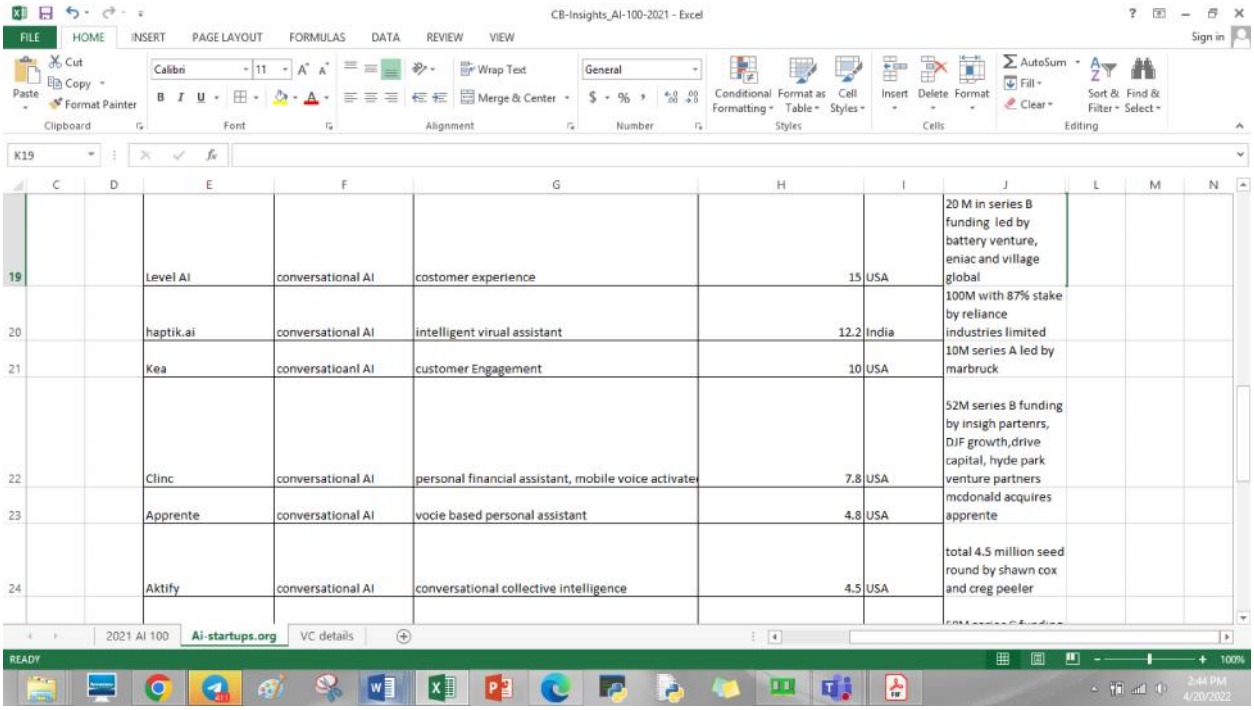
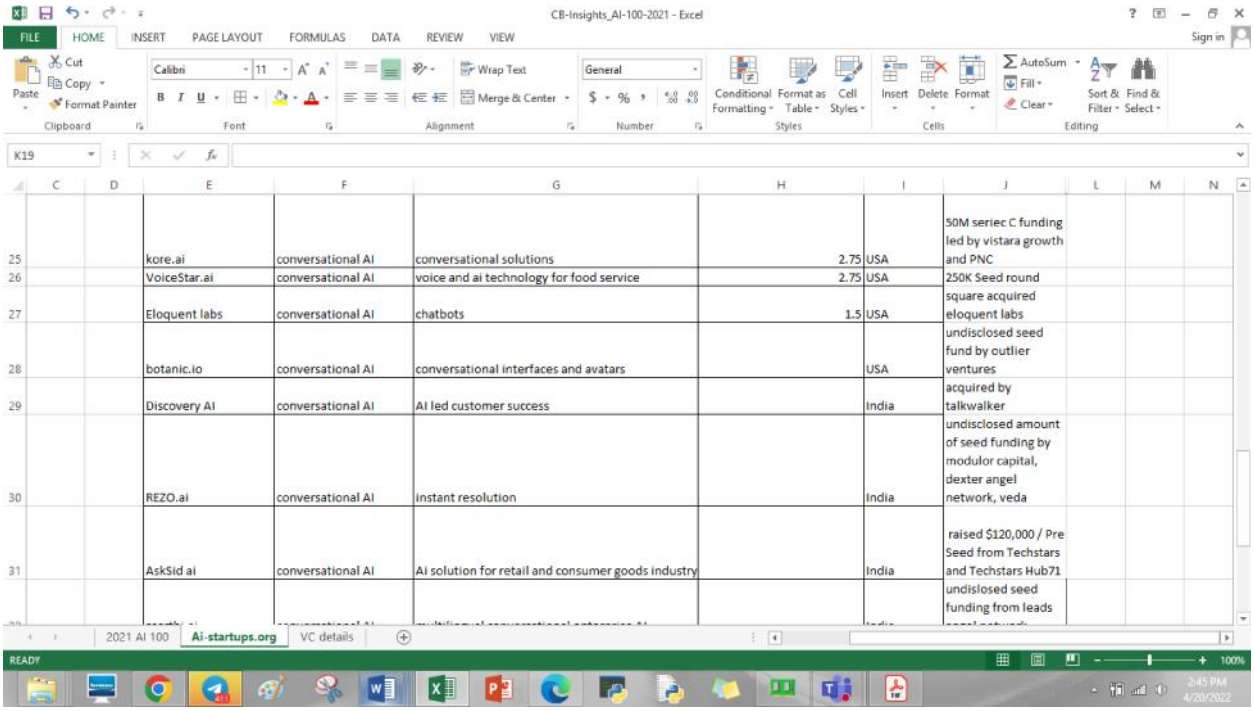
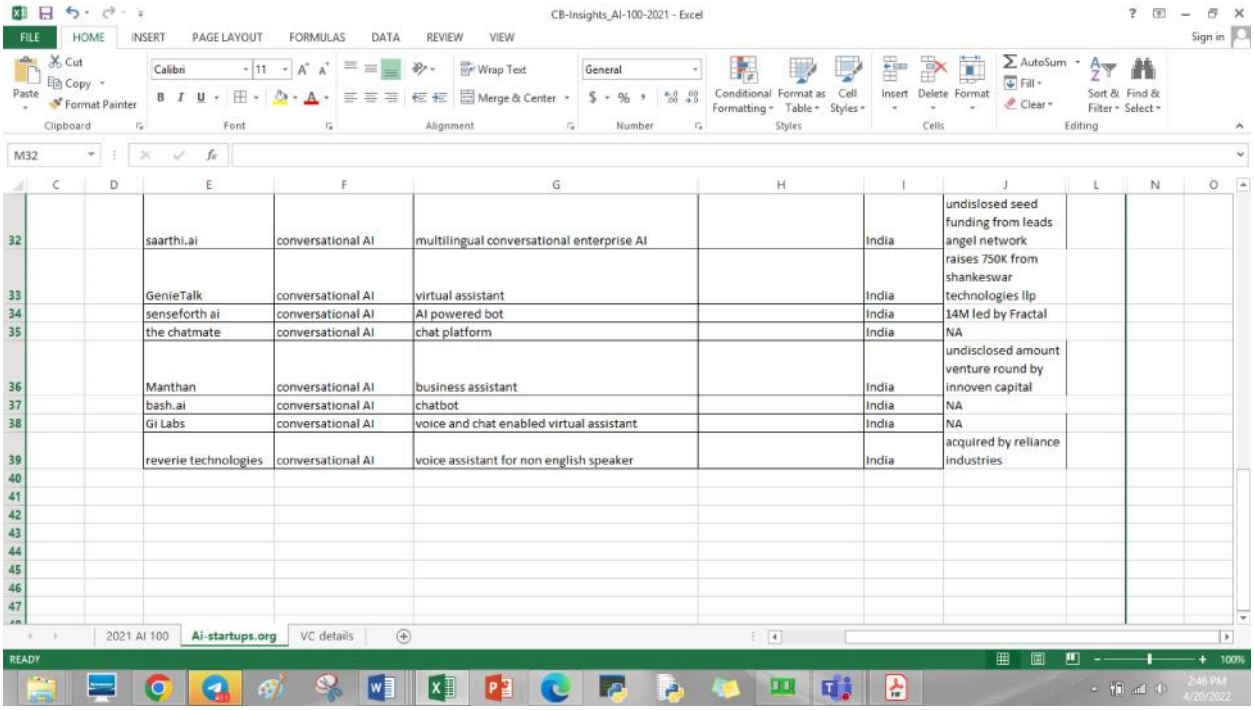
13	PolyAI	conversationalAI	machine learning platform	26	UK	14M Series B round led by khosla ventures
14	Voicebox Technologies	conversational AI	ASR, NLU, and TTS apps	25.3	USA	acquired by nuance communication for undisclosed amount
15	Avaamo	conversational AI	Deep learning software	23.5	India	14.2 series A funding led by intel capital
16	yellow.ai	Enterprise AI channel	customer Engagement	102.15	India	78.15 M series C round led by westbridge capital, sapphire ventures, salesforce venture and lightspeed venture partners
17	Semantic Machines	conversational AI	Ecommerce, social networks , productivity softwar	20.9	USA	microsoft acquired semantics.
18	orbita	conversational AI	Voice first	16.5	USA	9M series A finding by philips health technology ventures and healthx ventures



19	Level AI	conversational AI	costomer experience	15	USA	20 M in series B funding led by battery venture, eniac and village global
20	haptik.ai	conversational AI	intelligent virual assistant	12.2	India	100M with 87% stake by reliance industries limited
21	Kea	conversatioanl AI	customer Engagement	10	USA	10M series A led by marbruck
22	Clinc	conversational AI	personal financial assistant, mobile voice activate	7.8	USA	52M series B funding by insigh partenrs, DJF growth,drive capital, hyde park venture partners
23	Apprente	conversational AI	vocie based personal assistant	4.8	USA	mcdonald acquires apprente
24	Aktify	conversational AI	conversational collective intelligence	4.5	USA	total 4.5 million seed round by shawn cox and creg peeler



25	kore.ai	conversational AI	conversational solutions	2.75	USA	50M seriec C funding led by vistara growth and PNC
26	VoiceStar.ai	conversational AI	voice and ai technology for food service	2.75	USA	250K Seed round
27	Eloquent labs	conversational AI	chatbots	1.5	USA	square acquired eloquent labs
28	botanic.io	conversational AI	conversational interfaces and avatars		USA	undisclosed seed fund by outlier ventures
29	Discovery AI	conversational AI	AI led customer success		India	acquired by talkwalker
30	REZO.ai	conversational AI	instant resolution		India	undisclosed amount of seed funding by modulor capital, dexter angel network, veda
31	AskSid ai	conversational AI	AI solution for retail and consumer goods industry		India	raised $120,000 / Pre Seed from Techstars and Techstars Hub71
						undislosed seed funding from leads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32 saarthi.ai | conversational AI | multilingual conversational enterprise AI | | India | undislosed seed funding from leads angel network
33 GenieTalk | conversational AI | virtual assistant | | India | raises 750K from shankeswar technologies llp
34 senseforth ai | conversational AI | AI powered bot | | India | 14M led by Fractal
35 the chatmate | conversational AI | chat platform | | India | NA
36 Manthan | conversational AI | business assistant | | India | undisclosed amount venture round by innoven capital
37 bash.ai | conversational AI | chatbot | | India | NA
38 Gi Labs | conversational AI | voice and chat enabled virtual assistant | | India | NA
39 reverie technologies | conversational AI | voice assistant for non english speaker | | India | acquired by reliance industries
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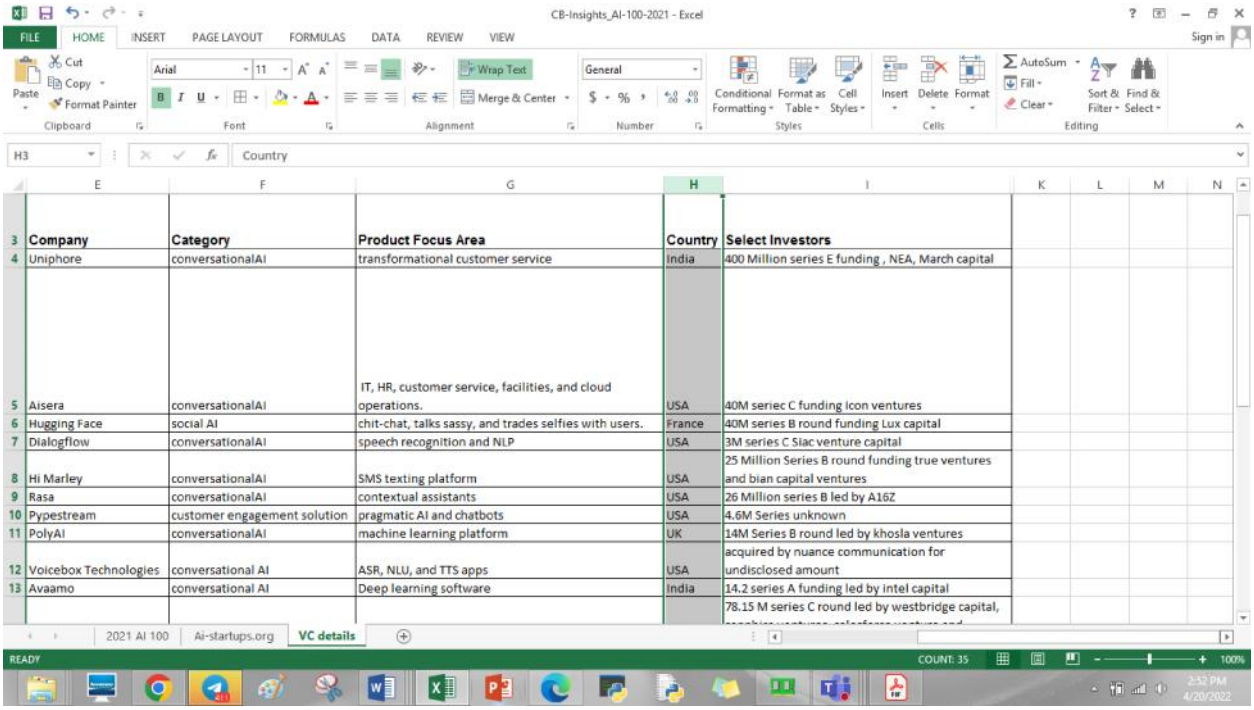
VC Details



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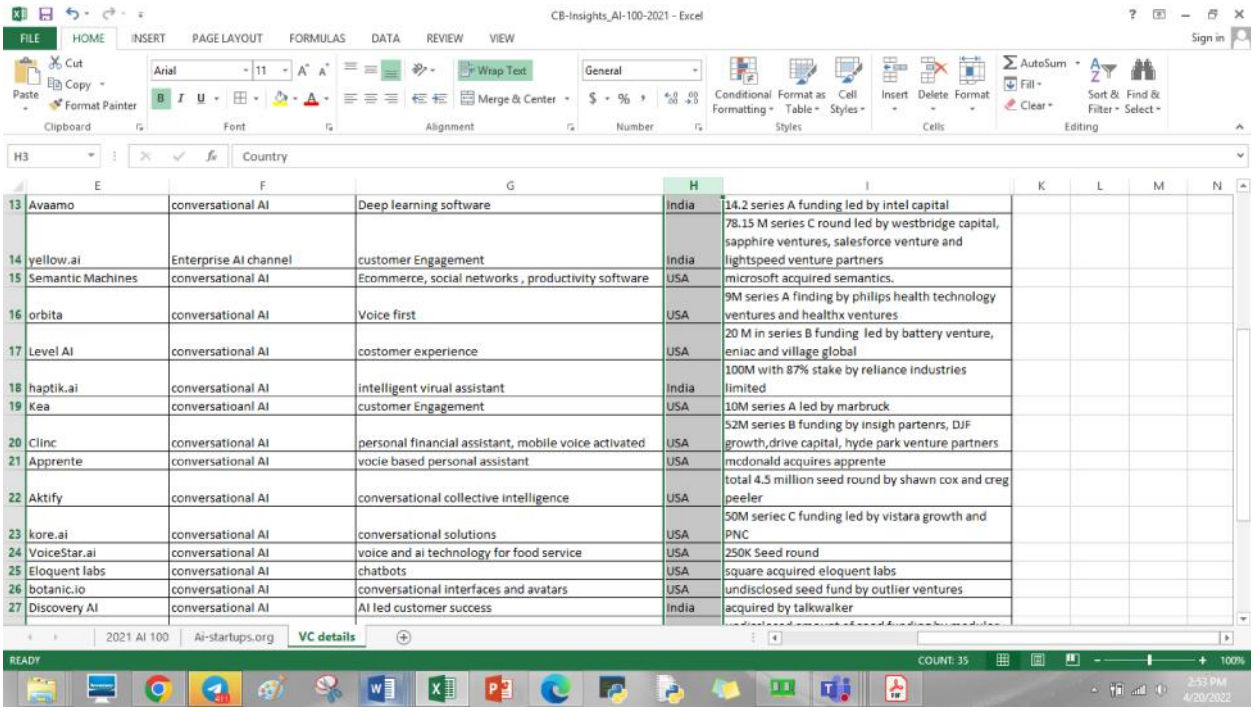

13	Avaamo	conversational AI	Deep learning software	India	14.2 series A funding led by intel capital
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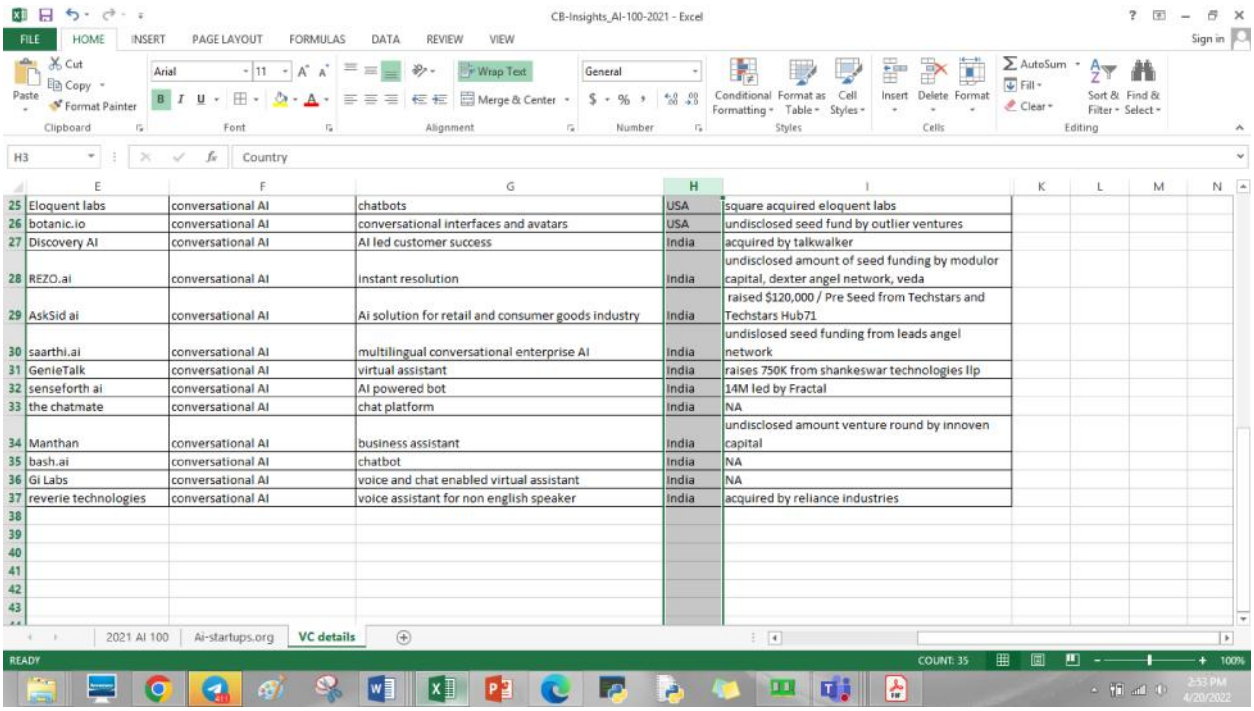

	E	F	G	H	I
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33	the chatmate	conversational AI	chat platform	India	NA
34	Manthan	conversational AI	business assistant	India	undisclosed amount venture round by innoven capital
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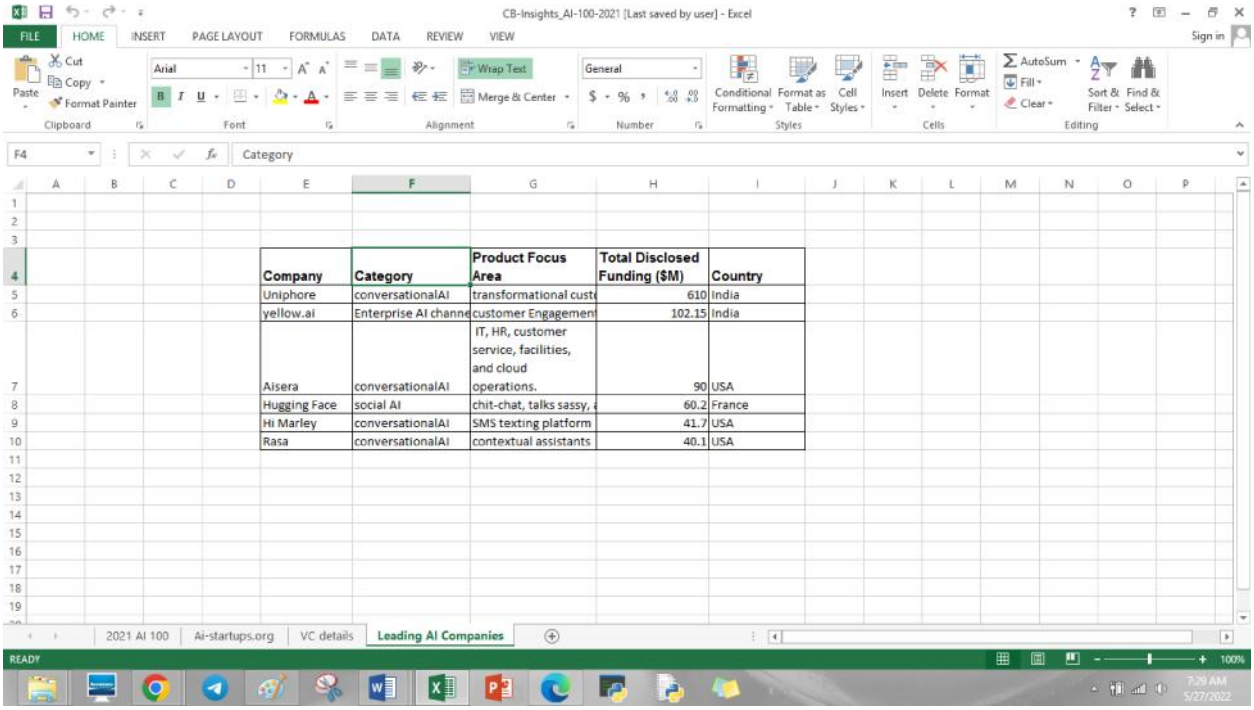
Top 5 Leading conversational AI companies



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