A
Mini-Project Report on

Virtual Assistant using Python

Submitted in partial fulfilment of the requirements
for the degree of
BACHELOR OF ENGINEERING
IN
Computer Science & Engineering
Artificial Intelligence & Machine Learning

by

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CERTIFICATE

This is to certify that the project entitled "**Virtual Assistant using Python"** is a bonafide work of Jeet Manjrekar (21106061), Shihab Karol (21106062), and Khushi Dhargawe (21106007) submitted to the University of Mumbai in partial fulfilment of the requirement for the award of **Bachelor of Engineering** in **Computer Science & Engineering (Artificial Intelligence & Machine Learning).**

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Project Report Approval

This Mini project report entitled" **Virtual Assistant using Python"** by **Jeet Manjrekar, Khushi Dhargawe & Shihab Karol,** is approved for the degree of **Bachelor of Engineering** in **Computer Science &Engineering**, (AIML) **2022-23**.

External Examiner: _____

Internal Examiner: _____

Place: APSIT, Thane
Date:

Declaration

We declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

Artificial Intelligence (A.I.) is a multidisciplinary field whose goal is to automate activities that presently require human intelligence. Recent successes in A.I. include computerized medical diagnosticians and systems that automatically customize hardware to user requirements.

The major problem areas addressed in A.I. can be summarized as Perception, Manipulation, Reasoning, Communication, and Learning. Perception is concerned with building models of the physical world from sensory input (visual, audio, etc.). Manipulation is concerned with articulating appendages (e.g., mechanical arms, locomotion devices) in order to affect a desired state in the physical world.

Reasoning is concerned with higher level cognitive functions such as planning, drawing inferential conclusions from a world model, diagnosing, designing, etc. Communication treats the problem understanding and conveying information using language.

Finally, Learning treats the problem of automatically improving system performance over time based on the system's experience. Many important technical concepts have arisen from A.I. that unify these diverse problem areas and that form the foundation of the scientific discipline. Generally, A.I. systems function based on a Knowledge Base of facts and rules that characterize the system's domain of proficiency.

The elements of a Knowledge Base consist of independently valid (or at least plausible) chunks of information. The system must automatically organize and utilize this information to solve the specific problems that it encounters. This organization process can be generally characterized as a Search directed toward specific goals.

The search is made complex because of the need to determine the relevance of information and because of the frequent occurrence of uncertain and ambiguous data. Heuristics provide the A.I. system with a mechanism for focusing its attention and controlling its searching processes.

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CHAPTER 1
INTRODUCTION

1. INTRODUCTION

Artificial Intelligence (AI) is intelligence- perceiving, synthesizing, and inferring information- demonstrated by machines, as opposed to intelligence displayed by non-human animals and humans.

The father of Artificial Intelligence, John McCarthy states a definition for AI which says that Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs.

The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalise, or learn from past experience. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out various complex tasks such as discovering proofs for mathematical theorems or playing chess with great proficiency. Still, despite continuing advances in computer processing speed and memory capacity, there are as yet no programs that can match human flexibility over wider domains or in tasks requiring much everyday knowledge. On the other hand, some programs have attained the performance levels of human experts and professionals in performing certain specific tasks, so that artificial intelligence in this limited sense is found in applications as diverse as medical diagnosis, computer search engines, and voice or handwriting recognition.

CHAPTER 2
LITERATURE SURVEY

2. LITERATURE SURVEY

2.1-HISTORY

Artificial intelligence was founded as an academic discipline in 1956, and in the years since it has experienced several waves of optimism, followed by disappointment and the loss of funding followed by new approaches, success, and renewed funding. In the first decades of the 21st century, highly mathematical and statistical machine learning has dominated the field, and this technique has proved highly successful, helping to solve many challenging problems throughout industry and academia.

The study of mechanical or "formal" reasoning began with philosophers and mathematicians in antiquity. The study of mathematical logic led directly to Alan Turing's theory of computation, which suggested that a machine, by shuffling symbols as simple as "0" and "1", could simulate any conceivable act of mathematical deduction. This insight that digital computers can simulate any process of formal reasoning is known as the Church–Turing thesis. This, along with concurrent discoveries in neurobiology, information theory and cybernetics, led researchers to consider the possibility of building an electronic brain. The first work that is now generally recognised as AI was McCullouch and Pitts' 1943 formal design for Turing-complete "artificial neuron's".

A brief summary of the dates can be given as-

1923: Karel Kapeks play named Rossums University Robots (RUR) opens in London.

1945: Isaac Asimov, alumni at Columbia University, invented the term Robotics.

1950: Turing Test for evaluation of intelligence was introduced by Alan Turing. Claude Shannon published detailed Analysis of chess playing as a search.

1956: John McCarthy coined the term Artificial Intelligence. 1958: John McCarthy invents LISP programming language for AI.

1964: Danny Bobrows thesis at MIT showed that computers can understand natural language well enough to solve algebra word problems correctly.

1979: The First Computer controlled autonomous vehicle; Stanford Cart was built.

1984: Dennett discusses the frame problem and how it relates to the difficulties arising from attempting to give robots common sense.

1990: Major advances in all area of AI: •Significant demonstrations in Machine Learning •Case-based reasoning

•Multi-agent planning

•Scheduling

•Data mining, web crawler

•Virtual reality

•Games

1997: The Deep Blue Chess Program beats the World Chess Champion, Gerry Kasparov

2000: Interactive Robot Pets become commercially available.

2.2-LITERATURE REVIEW

1. **A Survey of Artificial Cognitive: Implications for the Autonomous Development of Mental Capabilities in Computational Agents (IEEE Explore vol. 11, no. 2, April 2007):**

This survey presents an overview of the autonomous development of mental capabilities in computational agents. It does so based on a characterisation of cognitive systems as systems which exhibit adaptive, anticipatory, and purposive goal-directed behaviour. We present a broad survey of the various paradigms of cognition, addressing cognitivist (physical symbol systems) approaches, emergent systems approaches, encompassing connectionist, dynamical, and enactive systems, and also efforts to combine the two in hybrid systems. We then review several cognitive architectures drawn from these paradigms. In each of these areas, we highlight the implications and attendant problems of adopting a developmental approach, both from phylogenetic and ontogenetic points of view. We conclude with a summary of the key architectural features that systems capable of autonomous development of mental capabilities should exhibit. [1]

2. A Survey of Published Literature on Conversational Artificial Intelligence (IEEE Explore 2021):

Conversational artificial intelligence (AI), as a rapidly emerging technology, has made a huge impact in the fields of e-commerce, education, entertainment, health, journalism and productivity, and thus arousing the interest of governments, businesses and research institutions. Therefore, it is necessary to generate an overview of the recent developments in the field in order to plan further study effectively. To achieve the goal, we analyse the conversational AI literature between 2015 and 2020 with CiteSpace, which is used for the systematic evaluation of the knowledge structures. Based on the results of the analysis, we find the following insights:

(1) The evolution of conversational AI research involves many categories while two major disciplines-computer science and ergonomics-lead the way.

(2) The current research can be divided into two research areas: underlying technology architecture and smart scene applications.

By using multiple complementary scientometric methods, our study visually presents the research history, current research hotspots and emerging trends in the field of conversational AI, to further promote its technology and application research. [2]

3. The Role of Artificial in Social Media Big Data Analytics for Disaster Management (IEEE Explore 2018):

When any kind of disaster occurs, victims who are directly and indirectly affected by the disaster often post vast amount of data (e.g., images, text, speech, video) using numerous social media platforms. This is because social media has recently become a primary communication channel among people to report either to public or to emergency responders (ERs). ERs, who are from various emergency response organisations (EROs), usually consider to gain awareness of the situation in order to respond to occurred disaster. However, with the occurrence of the disaster, within minutes, the social media platforms are flooded with various kinds of data which become overwhelmed for ERs with big data. Further, in this posted data, there may be majority of the data consist of redundant and irrelevant content. With this, it becomes challenging for ERs to make sense and take decisions of/on the available big data. Despite recent advances in the technology, processing and analysing of the disaster related social media big data remains a challenging task.

Hence, in this paper, we focus on presenting an initial analysis of a systematic literature view on application of artificial intelligence to analyse/process social media big data for efficient disaster management. During a systematic review process 68 publications were identified. Thereafter, we analysed all the identified papers. From our analysis, we conclude that the most of the reviewed papers are on text and image classification and mostly convolutional neural networks have been employed for the classification. [3]

4. Role of Artificial Intelligence in fighting against COVID-19 (IEEE Explore 2020):

In today's world, AI has been contributed in variety of ways in our daily lives with numerous successful stories. Even during the outbreak of the corona virus disease (COVID-19) pandemic, AI has played a vital role in fighting against it. In this paper, we have represented a survey of AI applications that has been used in order to fight against the corona virus pandemic. From Internet of Things (IoT), text mining, medical, data analytics, AI has always played the important role. Motivated by the modern technology and Artificial Intelligence applications in wide areas, this paper mainly focus on importance of controlling the spread of COVID-19 pandemic and finding the solutions to prevent the severe effects of this corona virus disease. By using the methods of deep learning and artificial intelligence, a number of domains like agriculture, medical, electronics, retail, healthcare, etc. has achieved better results and benefits. This paper firstly represents the literature review and then the various applications of AI in fighting against the COVID-19. It is expected that this paper provides the organisation and researchers with new insights in how helpful the AI has been to improve the situation of COVID-19 and in further stopping the spread of COVID-19 outbreak. [4]

5. Augmented Intelligence: Surveys of Literature and Expert Opinion to Understand Relations Between Human Intelligence and Artificial Intelligence (IEEE access vol. 9, 2021):

Augmented intelligence (AuI) integrates human intelligence (HI) and artificial intelligence (AI) to harness their strengths and mitigate their weaknesses. The combination of HI and AI has seen to improve both human and machine capabilities, and achieve a better performance compared to separate HI and AI approaches. In this paper, we present a survey of literature to understand how AuI has been applied in the literature, including the roles of HI and AI, AI approaches, features, and applications. Due to the limited literature related to this topic, we also present a survey of expert opinion to answer four main questions to understand the

experts' implications of AuI, including:

a) The definition of AuI and the significance of HI in AuI
b) The roles of HI in AuI
c) The current and future applications of AuI in research, industry, and public, as well as the advantages and shortcomings of AuI and
d) End users' view of the application of AuI.

We also present recommendations to improve AuI, and provide a comparison between the findings from the surveys of both literature and expert opinion. The discussion of this paper shows the promising potential of AuI compared to separate HI and AI approaches. [5]

CHAPTER 3

Problem Statement

3. Problem Statement

Usually, user needs to manually manage multiple sets of applications to complete one task. For example, a user trying to make a travel plan needs to check for airport codes for nearby airports and then check travel sites for tickets between combinations of airports to reach the destination. There is need of a system that can manage tasks effortlessly.

We already have multiple virtual assistants. But we hardly use it. There are number of people who have issues in voice recognition. These systems can understand English phrases but they fail to recognise in our accent. Our way of pronunciation is way distinct from theirs. Also, they are easy to use on mobile devices than desktop systems. There is need of a virtual assistant that can understand English in Indian accent and work on desktop system.

When a virtual assistant is not able to answer questions accurately, it's because it lacks the proper context or doesn't understand the intent of the question. Its ability to answer questions relevantly only happens with rigorous optimisation, involving both humans and machine learning. Continuously ensuring solid quality control strategies will also help manage the risk of the virtual assistant learning undesired bad behaviours. They require large amount of information to be fed in order for it to work efficiently.

Virtual assistant should be able to model complex task dependencies and use these models to recommend optimised plans for the user. It needs to be tested for finding optimum paths when a task has multiple sub-tasks and each sub-task can have its own sub-tasks. In such a case there can be multiple solutions to paths, and the it should be able to consider user preferences, other active tasks, priorities in order to recommend a particular plan.

CHAPTER 4

Experimental Setup

4. Experimental Setup

4.1 Hardware Setup

For this project, we require the following hardware tools-

Arduino, Relay, Wires, External USB Connector and 100W Bulb.

4.2 Software Setup

For this project, the following software has been used-

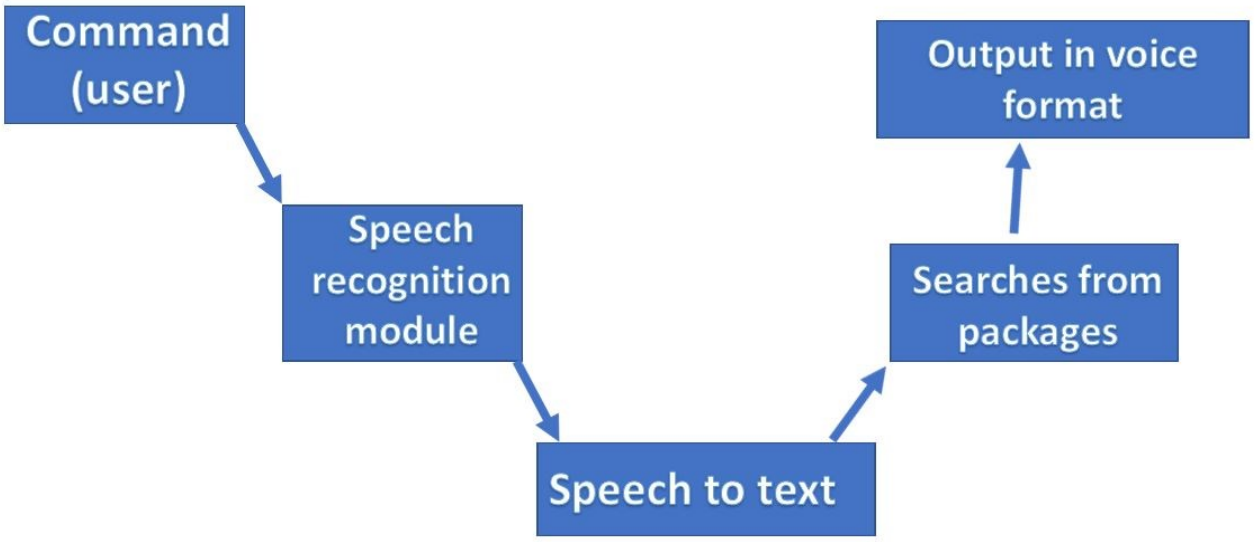
Arduino IDE, Visual Studio Code, Weather and News API.

CHAPTER 5

Proposed System & Implementation

5. Proposed System & Implementation

5.1 Block diagram of proposed system



BLOCK DIAGRAM OF HOW AIRA WORKS

5.2 Description of Block Diagram

User gives verbal commands to our virtual assistant, AIRA.

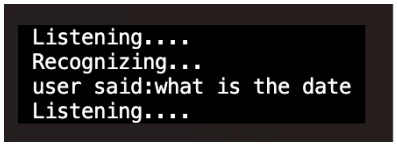
The user command is recognized by the speech recognition module.

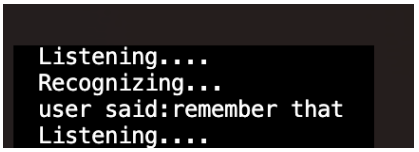
AIRA then converts the verbal commands to text.

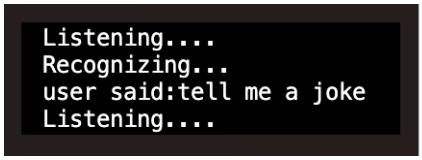
If we have to search for weather or news, we can do the same with the help of API key.

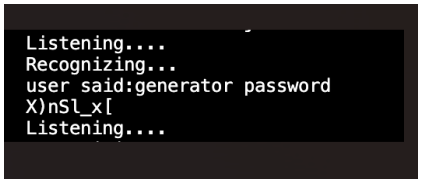
After each and every verbal command, it outputs verbally.

5.3 Implementation









CHAPTER 6

Conclusion

5. Conclusion

This survey is based on the concept of artificial intelligence, areas of artificial intelligence and its techniques. The field of artificial intelligence gives the ability to the machines to think analytically, using concepts. Artificial Intelligence will continue to play an increasingly important role in the various fields. We conclude that further research in this area can be done as there are very promising and profitable results that are obtainable from such techniques, while scientists have not yet realized the full potential and ability of artificial intelligence. This technology and its applications will likely have far-reaching effects on human life in the years to come. This review has not attempted to detail all the literature in the area but to report mainly the most recent work.

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Research paper

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[6] https://youtu.be/Lp9Ftuq2sVI