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The Age of Artificial Intelligence

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Abstract: *Humans are one of the smartest mammals on the earth but still, humans have limitations. They need to sleep, take breaks, play many roles in life and have many more limitations. But computers are known as the dumbest machines but they can surpass human intelligence and the term which makes computers so smarter is Artificial Intelligence. Artificial Intelligence has the capability to know things that are unknown to humans. It has the power to make processes much easier, faster and accurate, hence making the process more productive. No matter what the field is Artificial Intelligence can be very helpful to humans. Research has shown that Artificial Intelligence can be the best friend of human beings in every part of life. Research shows that How Artificial Intelligence is going to make a vast shift in the future in the way we humans live. Many podcasts, blogs, shows and books have been read about Artificial Intelligence and Humans to conduct research. Few theories of great personalities have also been considered. The research done showcases that Artificial Intelligence is going to change the world a lot and also going to surpass Human Intelligence. But it is not going to harm the human race but instead, it will help us out. And research tells us how humans can benefit the best from the age of AI. Artificial Intelligence is powerful and going to help all of us and we have to accept the change for the betterment of the human race. Human Intelligent is known as the most powerful Intelligence so does they have the power to create more powerful Intelligence - Artificial Intelligence.*

Keywords: Artificial Intelligence, Human Intelligence, Computers, Future, AI

I. INTRODUCTION

What actually an Artificial Intelligence is? What is it used for?
Why is it important?
What is it's impact on all of us and how it is quite a lot useful?

It is a Intelligence, naturally present in animals including the smartest animal of all – Humans, demonstrated by machine. In fact it is more powerful intelligence in many ways. Recently there has been many changes in the field of AI. Many new inventions have been generated and are in the process and will come in and it is going to change the world in a very wide angle. Here in this Research paper I have tried to find answers to all of the questions above. So before we dive into AI first you will need to understand what actually a Intelligence, Human Intelligence, is.

II. HUMAN INTELLIGENCE [HI]

Human Intelligence is a mental quality that consists of the ability to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment. Adaptation to the environment is the key to understanding what intelligence is and what it does. Such adaptation may occur in a variety of settings, such as learning a new language or a new skill, solving some unfamiliar problem or say something as performing a character in an act.

Adaptation means making a change in oneself in order to adapt more effectively with the environment, but it can also mean changing the environment to adapt to you. Effective adaptation lights upon a number of cognitive processes, such as perception, learning, memory, reasoning and problem-solving. The main emphasis in a definition of intelligence is that it is not a cognitive or mental process per se but rather a selective combination of these processes that is purposively directed toward effective adaptation. Intelligence is not related to a single ability but related to many abilities and how they are used.

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There are many theories of Intelligence such as:

- Psychometric theories:
  - Mental Abilities:
    - Analogies
    - Classification
    - Series Completion
  - Primary Mental Abilities:
    - Verbal Comprehension - Knowledge of Vocabulary and Reading
    - Verbal Fluency - Writing and producing words
    - Number - solving simple numerical computation and arithmetical reasoning problems
    - Spatial Visualization - visualizing and manipulating objects
    - Inductive Reasoning - reasoning the situation in the basis of past experience
    - Memory - recalling the data, such as people's names, faces etc.
    - Perceptual Speed - rapidly going through something to get a specific outcome.
- Cognitive theories:
  - Analytical Intelligence - Problem Solving Skills
  - Creative Intelligence - Relating problems to past situations
  - Practical Intelligence - Adapting to the change in the situation
  - Experiential Intelligence - Learning from the past Experience.
- Biological theories
  - Personality & Behavior
  - Inheritance, etc.

III. Artificial Intelligence [AI]

Artificial Intelligence is the ability of a computer to perform tasks commonly associated with intelligence beings. AI processes characteristic of humans, such as the ability to reason, discover new connections and meanings, or learn from past experiences. It possess the traits of Human Intelligence Power -

- **Learning:** Different forms of learning are applied to AI. The simplest one is by learning by doing, i.e. Trial and Error. The other one is Generalization that is applying the past experienced data to the new situation.
- **Reasoning:** Reasoning is the ability to draw inference appropriate to the situation. However, true reasoning is more than just drawing inference; it is actually drawing inferences that are relevant to the solution of the particular task or situation.
- **Problem Solving:** Problem solving in AI can be characterized as a systematic search through all of the possible actions in order to reach or solve some predefined goal or situation or problem.
- **Perception:** Environment is scanned via the means of various sensory organs, real or artificial, and that scene is then decomposed into separate objects in various spatial relationships.
- **Using Language:** Language is the sign of conventions. Full-fledged human language is productive, it can formulate an unlimited variety of sentences. And understanding of the human language is quite useful in AI.

IV. Fields of AI

As there are many traits in human being to define their intelligence so does AI have many branches (traits) which are also called fields of AI, those are

- **Machine Learning:** Machine Learning (ML) is a branch and subset of AI which focuses on the proper use of the data and algorithm to imitate the way that humans learn, gradually improving its accuracy.
- **Big Data:** Big Data is the large amount of dataset, that is a collection of data in huge amounts, yet growing exponentially with time. It's data with such large size and complexity that none of traditional data management tools can store it or process it efficiently.

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- **Natural Language Processing (NLP):** NLP is the branch of AI which is concerned with giving the ability to computers to understand the text and spoken words in the same way human beings can.
- **Neural Networks:** Also known as Artificial Neural Networks (ANN) or Simulated Neural Networks (SNN), it's a subset of ML eventually the subset of AI, and it is the heart for deep learning (three or more layers of Neural Networks) algorithms. Their name and structure are actually inspired from the human brain, duplicating the way that biological neurons signal to one another.
- **Speech Recognition:** Also known as Automatic Speech Recognition (ASR), Speech-to-text or Computer Speech
- Recognition, this gives computers the ability to process human speech into the written format.
- Vision Recognition, Robotics, Etc

V. TYPES OF AI

There are many types that AI can be divided into but there are mainly 2 types of categorization which are based on the capabilities and functionalities of the AI.

- Type 1 - Based on Capabilities of the AI.
  - Weak AI or Narrow AI
    - It performs the dedicated task with intelligence,
    - It is most common and currently available type of AI in the world of AI,
    - It cannot perform tasks beyond its field and it limited to the one tasks itself,
    - It fails in unpredictable way if it goes beyond its limit,
    - Examples - Apple Siri, IBM's Watson supercomputer, self-driving cars, purchasing suggestions on e- commerce websites, etc.
  - General AI
    - It performs the any intellectual task with efficiency like a human,
    - It is a type of system which can think like humans on its own,
    - There is no such system until now but engineers are working on it.
  - Super AI
    - It is type of intelligence which can surpass the Human Intelligence,
    - Perform tasks better than humans with cognitive properties,
    - It's the outcome of General AI
    - Some key characteristics of Strong AI could be ability to think, to reason, solve the puzzle, make judgments, plan, learn, and communicate on its own.
- Type 2 - Based on Functionality of the AI.
  - Reactive Machines
    - They are most basic types of AI,
    - They do not store memories or past experiences for future actions,
    - They only focus on current scenarios and react on it and give us the best possible outcome for the current situation,
    - Example - IBM's Deep Blue System, Google's AlphaGo, etc.
  - Limited Memory
    - They store past experiences or some data for a short period of time,
    - The data store is used of limited time period only,
    - Example - Self Driving Cars
  - Theory of Mind
    - It is a type of AI that could understand human emotions, people, beliefs, and be able to interact socially like humans,
    - Such type of AI is not yet developed but there are many researchers working on making one.

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- Self-Awareness
  - It is the future of AI itself,
  - It is type of AI that will have their own consciousness, sentiments, and self- awareness,
  - This kind of machines will be the Super Intelligent Machines,
  - It does not exist in real life and it is still a hypothetical concept.

VI. Difference between HI and AI

Students at MIT recently made an AI model which is able to tell whether an asymptomatic person is infected by covid or not just by the sound of the cough. Here the difference between the HI and AI can be clearly shown as humans can easily identify human normal cough but not a covid cough whereas an AI given a proper data of coughs can identify whether a person is having covid or not.

6.1 Steps

1. Collected the data by force cough recording method
2. Segregated the data based on people having Covid 19 positive, Asymptomatic but positive for covid.
3. Model is able to pick up a pattern in 4 bio markers -
   a. Vocal Cord Strength
   b. Sentiment
   c. Lung and Respiratory Performance
   d. Muscular Degradation

This clearly shows the difference between the HI and AI.

VII. Recent AI

Recently lot's growth has been seen in the field of AI in many aspects. AI gets better day by day, new and powerful innovations are being made which makes AI powerful. It's also on the top list of investors to invest their money in as many startups are generated on the basis of AI products. It's the trending and growing topic of the current world. Here are the few insights of the current AI field: AI paper publish charts -

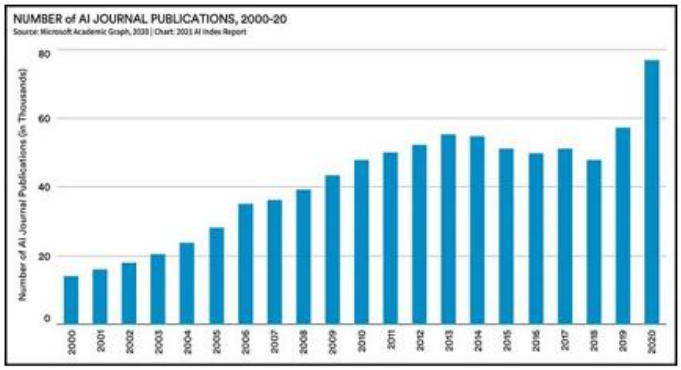

Figure 1: Research Paper Published data on AI topic More than 120 thousand peer-reviewed AI papers were published in 2019. The above charts also shows that between 2000-2019, AI papers went from 0.8 % of all peer-reviewed papers to 3.8 % in 2019.

7.1 NLP System Performance

Today's NLP is powered by deep learning and Clark of the AI index says it had inherited strategies from computer vision work, like training on huge databases and fine-tuning for specific applications. Measuring the NLP System Performance has become tricky as "Academics are coming up with metrics they think no one can beat, then a system comes along in six months and beats it," Clark says.

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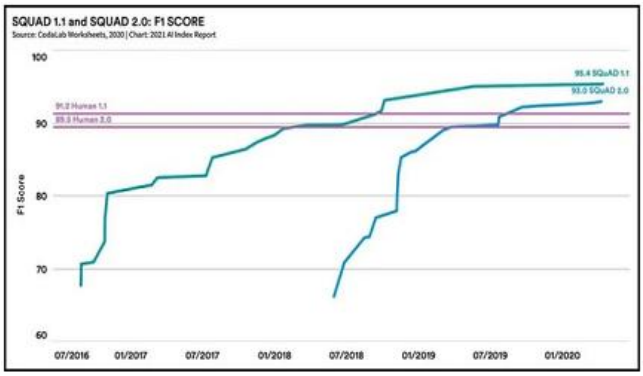

Figure 2: Betterment of NLP

7.2 The AI Job Market

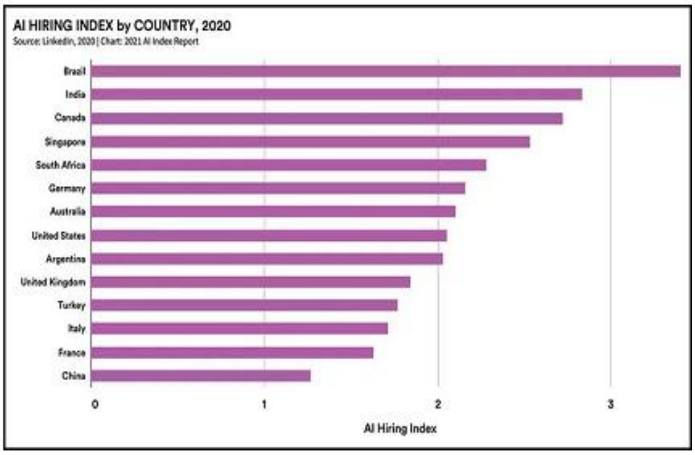

Figure 3: AI Hiring Data

Data gathered from LinkedIn shows that Brazil, India, Canada, Singapore, and South Africa had the highest growth in AI hiring from 2016 to 2020. That doesn't mean those countries have the most jobs in absolute terms (US and China continue to stay at top on those basis). LinkedIn also found out based on their data that a global pandemic did not put a dent in AI hiring in 2020.

Some more of the recent AI trending all over are:

- Tesla's Self Driving Car
- Instagram's and Youtube's Content Recommendations
- Amazon Alexa, Siri, etc.

VIII. FUTURE OF AI

It's the end of the Industrial Age and just the beginning of the Age of Artificial Intelligence. The day is not far away when we all would be surrounded by AI, helping us out and giving us the power to be more productive and enhance our livelihood. Though there are two kinds of predictions and thought on the future of AI, some say it is bad for humans -

"The development of full artificial intelligence could spell the end of the human race….It would take off on its own, and re-design itself at an ever- increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded." ~Stephen Hawking, BBC

"It seems probable that once the machine thinking method had started, it would not take long to outstrip our feeble powers… They would be able to converse with each other to sharpen their wits. At some stage, therefore, we should expect the machines to take control." ~ Alan Turing

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"AI doesn't have to be evil to destroy humanity – if AI has a goal and humanity just happens to come in the way, it will destroy humanity as a matter of course without even thinking about it, no hard feelings."
Elon Musk, Technology Entrepreneur, and Investor, While others feel it is for the betterment -

"We have seen AI providing conversation and comfort to the lonely; we have also seen AI engaging in racial discrimination. Yet the biggest harm that AI is likely to do to individuals in the short term is job displacement, as the amount of work we can automate with AI is vastly larger than before. As leaders, it is incumbent on all of us to make sure we are building a world in which every individual has an opportunity to thrive." Andrew Ng, Co-founder and lead of Google Brain

IX. CONCLUSION

Humans being the smartest mammals have limitations. They need to sleep, take breaks, play many roles in life and have many more limitations. But computers are known as the dumbest machines but still they can surpass human intelligence and the term which makes computers so smarter is Artificial Intelligence. Artificial Intelligence has the capability to know things that are unknown to humans. It has the power to make processes much easier, faster and accurate, hence making the process more productive. No matter what the field is, Artificial Intelligence can be very helpful to humans. Artificial Intelligence is powerful and going to help all of us and we have to accept the change for the betterment of the human race. Now it's the time to change and adapt to the Age of Artificial Intelligence.

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