1 - Introduction (1.1 and 1.2)

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1 What is AI?

Some of the researchers had defined AI in terms of **human performance** while others on basis of **rationality**. While some defined it on basis of **thought process** and **intelligent behaviour**. The applications of AI are seen in many fields like psychology, mathematics, economy, etc.

The **Turing Test** is proposed by Alan Turing based on a question "Can a machine think?".In earlier days, if a computer passes turing test it is considered to have human behaviour. To pass this test the bot requires **natural language processing**, **knowledge representation**, **automated reasoning** and **machine learning**. After this researchers developed total turing test, in which the bot also requires **computer vision** and **robotics** to pass this test. For a bot to think like a human it requires a computer program to know the precise theory of human mind. The study of theory of the human mind is called **cognitive science**. **Logic** also plays a keyrole in AI to write intelligent computer programs. A rational agent is one that tries to achieve best outcome based on probability. Rational agent senses the percept from the environment and then acts back on environment.

A standard AI model is probably not a right model in long run because standard model expects a fully specified objective from us. For an artificially designed game like chess it is a simple objective to win. But in the real world it is very difficult to specify the objective as in the case of self driving cars.

2 The Foundations of Artificial Intelligence

The foundations of AI are not only in central field of itself but also in fields of philosophy, mathematics, neuroscience, linguistics, etc.

2.1 Philosophy and Mathematics

The philosophical picture of the mind is the connection between knowledge and action. This question is very important in the field AI because it requires both reasoning and action. An algorithm given by Aristotle was used in **General Problem Solver** program. Fundamental ideas of AI include logic, probability and a new field of mathematics called computation.The theory of probability is considered of great importance for AI. Computation is very old in the field of mathematics, but the first non trivial algorithm is known to be Euclid's algorithm.

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2.2 Economics

Decision Theory which combines probability theory and utility theory to provide framework for individual decisions. Development of game theory included the surprising result that a rational agent should adopt policies that are randomized. Work in economics has contributed so much in the aspect of rational agents to the field of AI.

2.3 Neuroscience and Psychology

Neuroscience is the study of the nervous system. Without the right theory, faster machines just give you the wrong answer faster. The development of computer modeling led to the creation of the field of cognitive science. Both Intelligence Augmentation(IA) and AI are needed for machines to be useful to humans. IA is that computers augmenting human abilities rather than automate away human tasks.

2.4 Computer Engineering

Hardwares required for AI applications are graphics processing unit(GPU), tensor processing unit(TPU) and wafer scale engine(WSE). AI owes a debt to the software side of computer science, which has supplied the operating systems, programming languages and tools needed to write modern programs. But the debt has been repaid, work in AI has pioneered many ideas that have made their way back to mainstream computer science.

2.5 Control Theory and Linguistics

Modern control theory designs the systems which reduce cost function over time which matches the standard model of AI. Modern linguistics and AI started coming into the spotlight at about the same time. Linguistics and AI intersect in a particular field called computational linguistics or natural language processing.