

# THE LEARNING OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

*Design of intelligence in a device is known as “Artificial Intelligence.” We can use AI instead of Artificial Intelligence. It is a branch of science & engineering for making intelligent machine; especially intelligent computer program. This topic is based on the study of how to make computer to do things superior than people. AI focused on sorting of problem solving, nature of problem and so on which we do every day. It includes reasoning, communication, and calculation also.*

**Keywords:** Turing test, different jobs in AI, Blind and Heuristics techniques, etc.

### 1. Introduction

Intelligence is the computational part of the ability to achieve goals in the world. A degree of intelligence may vary in some machines, many animals and other people. Intelligence is ability to acquire, understand and apply knowledge. Pattern recognition, solving problems, creativity, learning, language processing are the task involving high level of mental process. Also Perceiving, thinking, curiosity, communicating, and activity in complex environment, understanding and learning from experience, knowledge applying at new situation is the behavior of intelligence. Intelligence requires knowledge like it is voluminous, it is hard to characterize, constantly changing, differs from data organizes in a way that correspond to way it will used.

#### A. Features of Intelligence

- 1 It will perform complex task
- 2 Recognize complex pattern
- 3 Learn from experience and instructions
- 4 It helps to solve unseen problem.

Intelligence are divided into three categories- Excellent, Good and Worst. By taking example of student, we can explain it deeply.

- 1 If student know concept individually then student called as “Excellent”.
- 2 If student know concept with the help of teacher then student called as “Good”.
- 3 If student neither understood by themselves nor with teacher then student called as “Worst”.

#### B. Applications

- 1 Natural language processing and understanding
- 2 Recognition of speech
- 3 Playing game
- 5 Computer vision and classification of various searching techniques in heuristic way

#### C. Advantages:

AI can able to do complex task then human being do with struggle or sometimes he may not. AI has the ability to take things fast.

- 1 Need of creativity in responses
- 2 Behind a certain decision, incapability to explain the logic and reasoning
- 3 Its decisions are based on facts rather than emotions.
- 4 Overcoming the natural disadvantage of tiredness in humans machines with artificial intelligence do not need any sleep?
- 5 Infinite function.
- 6 Defects and error are less

## D. Limitations

In every field, with the development of AI is that it will soon start substituting humans. Crime and poverty, depression suffers due to high rate of unemployment. Next is the best example of caring behavior is Nurses in hospital, machines will not be able to do with humanity.

- 1 AI is very much cost effective. Due to their complex nature, Creation of smart technologies always is an expensive also ongoing maintenance and repairing needs occurs.
- 2 To adapt to the changing business environment, Software programs need regular upgrading.
- 3 With other systems and platforms interoperability and usability.
- 4 If we decided to bring AI technology then we should take a risk for technological complexity.

## 3.Description

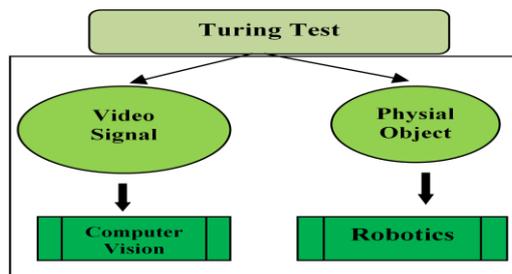
### A. Turing Test

For passing Turing test following steps are to be followed:

If we decided to bring AI technology then we should take a risk for technological complexity.

- 1 **Natural Language Processing (NLP):** NLP is used to make machine which enable for communication.
- 2 **Representation of Knowledge:** During interrogation knowledge is stored.
- 3 **Automated reasoning:** To draw new conclusion and to use store knowledge for answering questions.
- 4 **Machine learning:** For adapting new circumstances and for detecting and expressing extrapolate patterns this type of learning is required.

Below figure elaborate Turing test with its two sub categories; Here video signal gives vision of computer and physical objects related to robotics.



### B. Production systems

To structure AI programs this system is useful; such a way that it describes and performs searching process. Mainly production system consists of two parts-

- 1 "If Statement" called a sensory precondition;
- 2 "then statement" called an action.

If  $A \rightarrow B$  where LHS is known for condition and RHS is known for action. This rule are inferred like A take action B. Action part can be any step in the problem solving process. On other side condition is like a pattern which determines whether this rule applied or not.

### Characteristics of Production system-

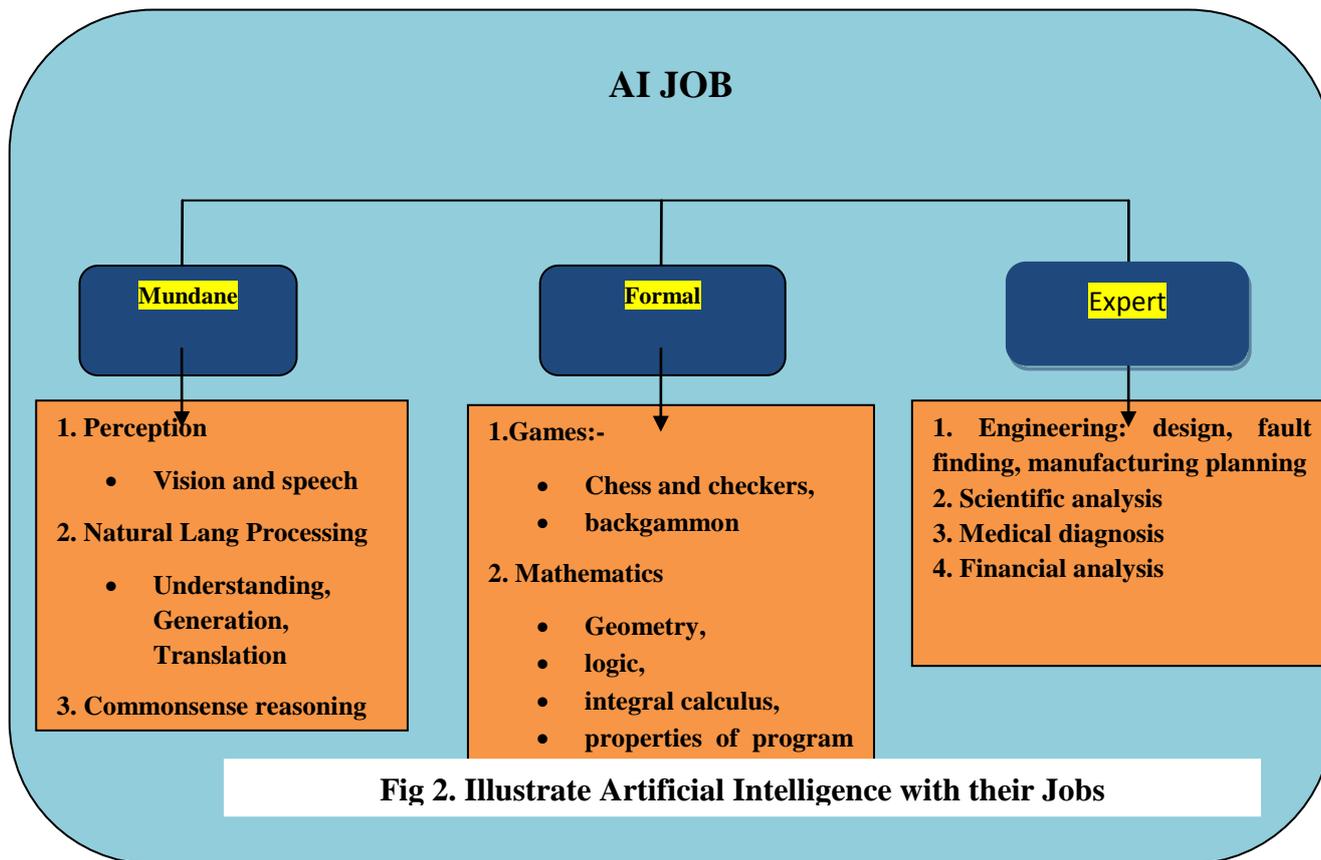
- 1 Knowledge separation
- 2 Production rules modularity
- 3 More flexible than algorithmic control i.e. Pattern Directed Control
- 4 Mapping Natural onto State space search
- 5 Opportunities for heuristics control can be built into rules
- 6 Simply control informative rules.
- 7 Independence in Language
- 8 Model for human problem solving

### C. Artificial Intelligence

Special type of job requiring special level of intelligence. Below following figure shows various special type of jobs with their sub types.

AI focused to take charge of solving problems which we always do every day. Like wake up early in the morning i.e. planning. It called as "Commonsense Reasoning."It describes about physical object with their action, connection, and

consequences to each other. For communication, it has the ability to use proper language with different ideas. Mundane type is also called as for Routine type. Second is Formal type which have two categories, one is games like checkers and chess. This helps people to play games with machine and other is mathematics like logic, geometry, integral calculus, theorem proving, etc helps to calculate various functions mathematically. Last is Expert type, categories into engineering which has manufacturing, designing, finding faults then medical diagnosis, analysis scientifically and finance.



**A. Blind Search:** It is also called as “Uninformed Search.” These types of search have no additional information for states. It is task of distinguishing a goal state from a non-goal state; all can do is generate successors. Example are Breadth First Search, Depth First Search and Bi-directional Search. We may get result of solving problem of above three techniques in either good solution or failure. So we evaluate this technique in four ways.

**Completeness:** It describes either the technique gives guarantee to get solution? Also complexity represents in terms of three quantities. First is  $b$  it is called branching factor. Second is  $d$  called as depth of shallowest goal node. Last is  $m$  called as maximum length of  $m$  state space in any path. Note that this  $b, d$  and  $m$  not be in capital and should be read as small  $b$ , small  $d$ , small  $m$ . BFS is complete after finding it expanding all shallowest node but DFS is not complete

**Optimality:** It helps to get optimal solution. Technically BFS is optimal but only if its path cost is non decreasing order function. DFS is not optimal.

**Time Complexity:** How much time does it take to get result. BFS is  $O(b^{d+1})$  and DFS is  $O(b^m)$

**Space Complexity:** To perform searching it tells how much memory/space is needed. BFS is  $O(|V|)$  where  $V$  is cardinality of all vertices and DFS is  $O(bm)$ .

BFS, DFS and Bi-directional searching may able to get shortest path so it has to generate, expand and dropped nodes. With the help of below table we can see results.

Techniques	Time	Memory	Optimal	Complete	Node Generated	Node Expanded	Node Dropped
<b>BFS</b>	$O(b^d)$	$O(b^d)$	Yes	Yes	NA	23	NA

<b>DFS</b>	$O(b^d)$	$O(b)$	No	Yes	NA	4743	NA
<b>Bi-Directional</b>	$O(b^{\frac{d}{2}})$	$O(b^{\frac{d}{2}})$	Yes	Yes	Yes	4832	NA

**Table 1. Comparative Analysis of BFS, DFS & Bidirectional**

**B. Heuristics Search:** It is also called as “Informed Search.” It is technique of finding whether one non goal state is more likely to be promising than other state. By order in which nodes should be expanded, all search strategies are distinguished.

Techniques of heuristics searching are Best First Search, Generate and Test, Hill Climbing, Constraint Satisfaction, Reduction of Problem and Means-Ends Analysis.

#### 4. Conclusion

Hence in this paper we study artificial intelligence deeply. It specially elaborates intelligence with their features, applications, advantages and limitations. Further it categories AI Job into three sub job with examples. Also boardly explains uninformed and informed searching techniques. It also gives quick glance to their sub techniques with example. Thus with the help of this paper one can easily know the concept of intelligence that are feeded artificially in a device.

#### 5. Acknowledgement

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