**Assignment #1**

**Due date: February 6 (Monday) Total Score: 15**

-------------------------------------------------------------------------------------------------------------------- **Objectives:** Understanding concepts of intelligence, AI in general, and applications

**Research** about the following capabilities to give a brief definition using your own language and applications for each one:

* Learning
* Understanding
* Reasoning
* Creativity
* Problem solving

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**Learning:**

The act of obtaining knowledge, experience, or skill. Learning can occur through various actions such as reading, listening, practicing, mimicking, observing, exploring, smelling, feeling, tasting, touching, etc. The knowledge, experience, and skill could be something entirely new to the learner; it could be related to what the learner already knows; or it could be a different version of the learner’s prior knowledge. The actions the learner takes to learn something may be a short, one-time activity like reading a book or watching a documentary, may require efforts over a long time like learning to ride a bike or practicing martial arts, or may be a complicated process like making connections and drawing patterns between things or learning to cope with a heartbreak, etc.

Some AI applications for learning include pattern recognition, object classification and detection, automatic handwriting generation, scene parsing, automatic colorization of grayscale images, generating sounds on old movies, automatic machine translation of texts and images that contain texts, synthesizing images from rough sketches, etc.

**Understanding :**

Understanding is the ability to understand something. If we can explain a concept easily that implies we have a good enough understanding of that concept. Understanding is not always related to learning concepts, it is associated with those concepts. If we are able to understand any concept properly, then we can predict the behavior of the object or system. For example, A psychiatrist understands another person's anxieties if he/she knows that person's anxieties, their causes, and can give useful advice on how to cope with the anxiety. Understanding can be classified into shallow understanding and deep understanding. Shallow understanding means someone who has limited understanding of things. However deep understanding is more predictive and accurate understanding that allows them to make explaination.

**Reasoning:**

To reason is to finding out the conclusion from the given set of statements or inputs using some logical technique. Conclusion can also be defined as inferences. It allows us to make decisions , predictions or judgements by giving some related basic information. For example, Person X must be either in college or home. He is not in college so, he must be at home.

Reasoning is divided into two types –

1. **Inductive Reasoning** : It takes the basis of specific observation to predict a generalise statements. It won’t guarantee that the conclusion is true if all of the premises are true. Here, conclusion statements can be false. For example, Sam is a student of computer science department. All students of computer science department play badminton. So, Sam plays badminton.
2. **Deductive Reasoning**: It takes the basis of generalise statements to predict the specific statement. It guarantees that if the premises are true then conclusion must be true. For example, People live in Fullerton go for a vacation on every weekend. Mona lives in Fullerton. So, Mona goes for a vacation on every weekend.

Applications of Reasoning are computer vision, predictive analytics, intrusion detection, natural language processing etc. Specifically, deductive reasoning is used in the field of mathematics and logic where small set of axioms and rules are used to build structure of irrefutable theorems.

**Creativity:**

The capability of being able to create something new. Creative Intelligence helps with the development of innovation, and original ideas. Also helps with questioning and examining ideas and being able to develop individual thinking and reasoning. The development of creative intelligence allows to let people make mistakes to later on learn from them, allow to question a process on how it is done, and allows thinking in fluidity rather than boxed ideas.

Applications for Creative Intelligence, for people, are art, innovations, science, architecture, and many other fields. Creative Intelligence is also applies with Artificial Intelligence such as AARON project which is an A.I. that creates abstract art. Any A.I. that has the capabilities of creating new and innovative ideas (such as art or even think of a new move set in the game GO) can be considered developing creative intelligence. [Source1] [[Source2]](https://medium.com/@DavidVandegrift/can-artificial-intelligence-be-creative-40e7eac56e71#.89mbmjdwa)

**Problem solving:**

Problem solving is the act of finding solutions to problems. It includes understanding a problem, determining the reasons that cause of the problem, finding all the possible methods can use to get solutions and implementing a solution. Therefore, problem solving in AI requires combination of many abilities to be able to find solutions.

There are many applications for problem solving in a wide range of fields including:

a) Games: Machines simulate human-like intelligence to solve puzzles, play chess

b) Internet searching: Nowadays, internet searching engines are very powerful. They can find solution and information for almost everything, translating between languages…

c) Transportation and Navigation: Some example such as self-driving cars or those applications that can solve route finding problem, touring problem and travelling salesperson problem.

d) Heavy Industry: Robots are used to do the jobs that are considered dangerous to humans.

e) Finance: Trading applications that can react to changes overnight or when business is not taking place. There is also an application like Wallet AI that monitors an individual's spending habits and provides ways to improve them.