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ASSIGNMENT NO:-1B

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Q.1 Explain various elements of cognitive system

→ Cognitive computing is new type of computing with goal of more accurate models of how human brain/mind senses, reasons & responds to stimulus.

- Generally, term cognitive computing is used to refer to new hardware &/ software that mimic following functioning of human brain thereby improving human decision making cognitive computing applications links data analysis & adaptive page i.e, Adaptive user interface to adjust content for particular type of audience.
- Following are elements of cognitive system:

(1) Interactive:
- System may interact easily with users so that those users can define their needs comfortably.
- They may interact also with other processors, devices & cloud services as well as with people.

(2) Adaptive:
- This is the first step in making a machine learning based cognitive system.
- The solution should mimic the ability of human brain to learn & adapt from the surroundings.
- The system can't be programmed for an isolated task. It needs to be dynamic in data gathering, understanding goals, & requirements.

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(3) Iterative & stateful:
- The system should "remember" previous interactions in a process & retrieve information that is suitable for the specific application at that point in time.
- It should be able to define the problem by asking questions or finding an additional source.
- This feature needs a careful application of the data quality & validation methodologies in order to ensure that the system is always provided with enough information & that the data sources it operates on to deliver reliable & up-to-date input.

(4) Contextual:
- They must understand, identify, & extract contextual elements such as meaning, syntax, time, location, appropriate domain, regulation, user's profile, process, task & goal.
- They may draw on multiple sources of information, including both structured & unstructured digital information, as well as sensory inputs (visual, gestural, auditory, or sensor-provided).

Q.2 Write note on language model.

→ Language modeling is the use of various statistical & probabilistic techniques to determine the probability of a given sequence of words occurring in a sentence.

- Language models analyze bodies of text data to provide a basis for their word predictions.
- Language models are used in natural language processing (NLP) applications, particularly ones that generate text as an output. Some of these application includes machine translation & question answering.
- Some common statistical language modelling types are :- N-gram, Unigram, Exponential, Continuous space, Bidirectional.
- A good language model should also be able to process long-term dependencies, handling words that may derive their meaning from other words that occur in far-away, disparate parts of the text.
- It is used directly in a variety of industries including tech, finance, healthcare, transportation, legal, military & government.
- Language model determine word probability by analyzing text data. They interpret this data by feeding it through an algorithm that establishes rules for context in natural language.
- Then, the model applies these rules in language tasks to accurately predict or produce new sentences.

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Q-3 Write a note on machine translation

→ Machine translation (MT) automatically converts words or phrases from one language into another.

- This is generally done on text; however, MT can be combined with STT (source text) & TTS (target text) conversions to provide mixed-mode translation.
- MT technology could help a soldier during operations in foreign-language environments. For eg. foreign-language signs, news, & radio intercepts could be roughly translated to the soldier's language to aid in understanding the battle space.
- Current MT technology, as typified by various web-based systems, can be helpful for extracting some of key words & phrase from foreign language material, but such translation are by no means transparent, as they generally contain many errors.
- Following are few example :-
  - Google translate goes through 100 billion words per day.
  - Systran.b became 1st software provider to launch to a machine translation engine in more than 30 languages in 2016.
  - Facebook uses machine translation to translate text in posts & comments automatically in order to break language barriers.
  - Microsoft brings AI-powered translation to end users & developers on android, IOS & Amazon fire tablets so they have access to Internet or not.

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Q.4 Explain following terms:

a) Phonology:

→ Phonology is defined as the study of sound patterns & their meanings, both within & across languages.

- An example of phonology is the study of different sounds & the way they come together to form speech & words - such as the comparison of the sounds of the two "p" sounds in 'pop-up'.

b) Morphology

→ The morphology method is used to describe a technique for identifying, indexing, counting & parameterizing the collection of all possible devices to achieve a specified functional capability

c) Lexical analysis

→ It involves identifying & analyzing the structure of words.

- Lexicon of a language means the collection of words & phrases in a language.
- Lexical analysis is dividing the whole chunk of text into paragraphs, sentence & words

d) Syntactic analysis

→ Syntactic analysis, also referred to as syntax analysis or parsing, is the process of analyzing natural language with the rules of a formal grammar.

c) Word Sence Disambiguation

→ Word sense disambiguation, in natural language processing (NLP) may be defined as the ability to determine which meaning of word is activated by the use of word in a particular context.

Q.5) Explain PEAS description for WUMPUS world

→ PEAS represents Performance Measures, Environment, Actuators, & Sensors. The PEAS description helps in grouping the agents.

(1) Performance measures:
- Agents get the gold & return back safe = +1000 points.
- Agent dies = -1000 points
- Each move of the agent = -1 point
- Agent uses the arrow = -10 points.

(2) Environment:
- A cave with 16(4x4) rooms.
- Rooms adjacent to the Wumpus are stinking.
- Rooms adjacent to the pit are breezy.
- Agent's initial position - Room [1,1] & facing right side.
- Location of Wumpus, gold & 3 pits can be anywhere except in Room [1,1].

(3) Actuators:
- Device that allow the agent to perform the following actions in the environment — Move forward, turn right, turn left, shoot, Grab, release.

(4) Sensors:
- Devices which helps the agent in sensing the following from the environment - Breeze, stench, glitter, Scream, Bump.