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Name : Mahir S. Korangale

Class : B.E.

Branch : IT

Sem : VII

Roll No. : 26

Subject : Artificial Intelligence

DOP	DOA	Marks	Sign	

Q.1 →

Explain PEAS descriptors for WUMPUS world

PEAS represents Performance Measures, Enviorment, Actuators and Sensors. The PEAS description helps in grouping agents PEAS Description for Wumpus World problem

a] Performance Measures :
- Agent gets the gold and return back safe = +1000 points
- Agent dies = -1000 points
- Each move of the agent = -1 point
- Agent uses the arrow = -10 points.

b] Environment :
- A Cave with 16 (4×4) rooms
- Rooms adjacent (not diagonally) to the Wumpus are stinking.
- Rooms adjacent (not diagonally) to the pit are breezy.
- The room with gold glitters.
- Agent's initial position - Room [1,1] and facing right side.
- Location of Wumpus, gold & 3 pits can be anywhere, except in Room [1,1]

c] Actuators :
Devices that allow the agent to perform the following actions in the enviornment
- Move forward
- Turn Right. Turn left

- Shoot
- Grab
- Release

d] Sensors : Devices which help the agent in sensing the following from environment.
- Breeze
- Strench
- Glitter
- Scream (When the Wumpus is killed)
- Bump (When the agent hits the wall)

The Wumpus world agents has foll. characters
- Partially Observable : Knows only local perception
- Deterministic : Outcome is precisely specified.
- Sequential : Subsequent level of actions performed
- Static : Wumpus, pits are immobile.
- Discrete : Discrete environment.

Date :

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Q.2) Explain various elements of Cognitive System

- Cognitive Computing is a new type of computing with the goal of more accurate models or how the human brain / mind senses, reasons and responds to stimulus.

- Generally, the term Cognitive Computing is used to refer to new hardware and / or software that mimic the following functioning or the human brain thereby improving human decision making. Cognitive Computing applications link data analysis and adoptive page displex

- Following are the elements of the Cognitive System :-

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

ⓑ **Adaptive :** They may be engineered to feed on dynamic data in real time.
They may learn as information changes and as goals and requirements evolves.
They may resolve ambiguity & tolerate unpredictability behaviour.

ⓒ **Contextual :** They may understand, identify & extract contextual elements such as meaning, syntax, location, appropriate domain etc.

(d) Iterative & Stateful : They may used in defining a problem by asking questions or finding additional source input if a problem statement is incomplete.

Q.3 → Write note on language Model

- The goal of a language model is to compute a probability of a token e.g. a sentence or sequence of words and are useful in many different NPL application

- Language model actually a grammar of a language as it gives the probability or word that will follow.

- In case of (LM) the probability of a sentence as sequence of words is :- $P(\omega) = P(\omega_1, \omega_2, \omega_3, \ldots \omega_n)$

- It con also be used to find probability of the next word in sentences : $P(\omega_3 / \omega_1, \omega_2, \omega_3, \omega_4)$

- A model that computes either of these is language Model.

- There are various language Model available, a few are :-

(a) Methods using markov assumption :-
A process which is stochastic in nature, is said to have the markov property, if the traditional probability of future states depends upon present state.

(b) N-gram Models

- From the markov Assumptions, we can formally define model where $K = n-1$ as following :-

$$P(W_i \mid W_1, W_2 \dots W_{i-1})$$

(c) Unigram Model $(K = 1)$:-

$$P(W_1 W_2 \dots W_n) = \prod_i P(W_i)$$

(d) Bigram Model $(K = 2)$:-

$$P(W_1 \mid W_1, W_2 \dots W_{i-1}) = P(W_i \mid W_{i-1})$$

$$C(W_1 \mid W_{i-1}) = \frac{Count(W_{i-1} \dots W_i)}{Count(W_{i-1})}$$

Q.4) → Write a note on Machine Translation

Machine Translation is classic test of language understand. It consists of both language analysis & generation.

Many machine translation system have huge commercial use. Following are few of the examples.

- Google Translate goes through 100 billion words per day.
- eBay uses machine translation techniques to enable the cross border trade and connect buyers / Sellers around globe.

- Facebook uses (MT) to translate text in posts and comments automatically in order to break language barriers.
- Systran became the first software provider to launch a neural machine translation engine in more than 30 languages in 2016.
- Microsoft brings AI powered translation to end users and developers on Android, iOS, and Amazon Fire whether or not they have access to the Internet.
- In a traditional Machine Translation System, Parallel corpus a collection of trees is used to each of width is translated into one or more other languages than the original. For e.g., given the source language e.g. French & target language.
- It is about that, this approach skips hundred of important details, requires a lot of the human feature engineering and is overall a complex system.

Q.5 Explain the following terms

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a] Phonology :-

- It is the study of organizing sounds systematically in an NLP (Natural language Processing) system

b] Morphology :-

It is a study of the constitution of words from primitive meaningful units .

c] lexical Analysis :-

lexicon is the words and phrases in the language. lexical analysis deals with the recognition and identification of structure of sentences. It divides the paragraphs in sentences, phrases and words.

d] Syntatic Analysis :-

In syntatic analysis the sentences are parsed as noun, verbs, adjective and other parts of the sentences. In this phase the grammer of the sentence is analyzed in order to get relationship among different words in sentences.

For e.g. "Manago eat me" will be rejected by analyzer

e] Word Sense Disambigution :-

While using words that have more than one meaning we have to select the meaning which makes most sense in context. For example we are typically given a list of words associated word senses e.g from a dictionary or from an online resource such as wordnet