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Assignment No. - 01 A

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Subject :- AI IS LAB

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Q 1

Explain PEAS descripturs for wumpus world

i) Performance measure

- +100 for grabbing the goal and coming back to start.
- -200 if the player is killed
- -1 per action
- -1v for using the arrow

ii) Environment

- Empty Rooms
- Room with wumpus
- Rooms neighbouring to wumpus which are smelly
- Rooms with bottomless pits
- Rooms neighbouring with bottomless pits which are breezy
- Room with gold which is glittery
- Arrow to start the wumpus

iii) sensors assuming a robotic agents)

- camera to get the view
- odour sensor to smell the stench
- Audio sensor to listen to the screen and bump.

iv) Effectors assuming a robotic agent)

- motor to move left right
- Robot arm to grab the gold
- Robot mechanism to shoot the arrow.

The wumpus world agent has following characteristics:-

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- a. fully observable
 - b. Deterministics
 - c. Episodic
 - d. static
 - e. Discrete
 - f. single agent

Q. 2

Explain various elements of cognitive system.

→ Cognitive Computing is a new type of computing with the goal of more accurate models of 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 of the human brain thereby improving human decision making. Cognitive computing applications links data analysis and adaptive page digital adaptive user interfaces to adjust content for a particular type of audience. Following are elements of cognitive system :-

a. Interactive :- They may interact easily with users so that the users can define their needs comfortably.

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They may also interact with other processors, devices and cloud services, as well as with people.

b. Adaptive :- They may be engineered to feed on dynamic data in real time. They may learn as information changes and as goals and requirements evolve. They may resolve ambiguity and tolerate unpredictability behaviours.

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

d. Interactive and stateful :-

They may widen 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 ~~used~~ in many different NLP applications.

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

- In case of (LM) the probability of a return as sequence of words is :-

$$P(w) = P(w_1, w_2, w_3, \dots, w_n)$$

- It can also be used to find the probability of the next word in return.

$$P(w_5 | w_1, w_2, w_3, w_4)$$

- A model that computes either or 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 conditional probability of return states depends upon present state.

b) N-gram models :-

from the markov assumptions, we can formally define models where

$k = n - 1$ as following :-

$$P(w_i | w_1, w_2, \dots, w_{i-1})$$

c) unigram model ($k=1$):-

$$P(w_1 w_2 \dots w_n)$$

$$= \prod_i P(w_i)$$

d) Bigram model ($k=2$):-

$$P(w_1 / w_1 w_2 \dots w_{i-1})$$

$$= P(w_i / w_{i-1})$$

$$(w_i / w_{i-1}) = \frac{\text{count}(w_{i-1} \dots w_i)}{\text{count}(w_{i-1})}$$

Q4 write a note on machine Translation:-
 → Machine Translation is classic test of Language understand. It consists of both language analysis and generation. Many machine translation system have huge commercial use following are for the examples:-

- Google Translate goes through 100 billion word. Per day
- eBay use machine translation technique to enable crossborder trade and connect buyers / sellers around globe.
- Facebook uses (MT) To translate text in post and comments automatically in order to break language barrier.

- 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 ~~to~~ rules is used to each of which is translated into one or more other languages than the original for example given the source language e.g. French and the target language e.g. English, multiple statistical models needs to be build, including a Probabilistic formulation using the Bayesian Rule, a translation model $p(t|s)$ trained on parallel corpus and a language model $p(s)$ trained on the English corpus.
- It is obvious that, this approach skips hundreds of important details, require a lot of human feature engineering and is overall a complex system.

Q.5 Explain the following terms:-

a) Phonology:-

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

b) morphology:-

It is a study of construction of words from primitive meaningful units.

c) Lexical Analysis:-

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

d) Syntactic Analysis:-

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

For example, "mango ^{eat} ~~each~~ me" will be rejected by analyzer.

e. word sense disambiguation :-
while using words that have more
than one meaning we have to select
the meaning which makes the most sense
in context. For example, we are
typically given a list of words associated
word senses (eg. from a dictionary
or from an online resource such
as word net).