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Assignment No:- LB

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Subject: AI

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Q. 1 Explain PRAS description for wimpus world
Ans: Performance measure

Performance measure

+100 for grabbing the goal & coming back to start

- 200 if the player is killed.

- 1 per action

- 10 for using the arrows

ii) Environment

Empty rooms

- room with wampus

- rooms neighbouring to wumpus which are smelly

- rooms with bottomless pits:

- rooms neighbouring with bottomless pits which are breezy.

- Room with gold which is glistening.

- Arrive to shoot the wumpus.

iii) Sensors (assuming a robotic agent).

- camera to get the view

- Odour sensor to smell the stench.

- Audio sensor to let listen to the screen & bump.

iv) FRR factors assuming a robotic

- motor to move left/right

- robot arm to grab the gold.

Robot mechanism to shoot the arrows.

The Wumpus world agent has following characters:

- a) fully observable
- b) deterministic
- 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 & responds to stimuli generally. The term cognitive computing is used to refer to new hardware & /or software that mimic the following functioning on the human brain thereby improving human decision making. Cognitive computing applications links data analysis & adaptive page i.e adaptive user interface 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 those users can define their needs comfortably. They may also interact with other processors, devices & 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 & as goals & requirements evolve. They may resolve ambiguity & tolerate unpredictability behaviours.

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

d) Interactive & stateful:- they may lie 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) & are useful 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 sentence 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 sentence: $P(w_5 | w_1, w_2, w_3, w_4)$
 - 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 conditional probability of future states depends upon present state.

b) N-gram models have better performance

- from the markov assumptions, we can formally define models where $K = n-1$ as following:

c) Unigram model ($K=1$)

n-gram model (k=1): -

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

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

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

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 cross border trade & connect buyers / sellers around globe.
 - facebook uses to translate text in posts & 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 & developers on android, ios & Amazon fire whether or not they have access to the internet.
 - In a traditional machine translation system, parallel corpus a collection of texts 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 & the target language e.g. English, multiple statistical models needs to be build, including a probabilistic formulation

using the rule translation model $p(F|E)$ trained on parallel corpus & a language model $p(E)$ trained on the English corpus.

- It is obvious that, this approach skips hundreds of important details, requires a lot of human feature engineering & 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 & phrases in language.

lexical analysis deals with the recognition & identification of structure of sentences. It divides the paragraphs in sentences, phrases & words.

d) syntactic Analysis:

- In syntactic analysis the sequences are parsed as noun, verbs, adjective & other parts of sentences. In this phase the grammar of the sentence is analyzed in order to get relationship among different words in sentences. for example, "mango eats 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 sense (e.g. from a dictionary or from an online resource such as wordnet).