Assignment No :- 1B

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Subject :- AI

Dop	Doc	Remark	Sign

Q1] Explain PEAs descriptors for WUMPUS world

→ i) Performance measure
- +100 for grabbing the goal & coming back to start.
- -200 if the player is killed
- -1 Per action
- -10 for using the arrow

ii] Environment
- Empty rooms
- Room with WUMPUS
- ~~Roms~~ Rooms but neighbouring to WUMPUS which are smelly
- Rooms with bottomless pits
- Rooms neighbouring with bottomless pits which are breezy.
- Room with gold which is glitery
- Arrow to shout the WUMPUS.

iii] Sensors (assuming a robotic agent)
- camera to get the view
- odour sensor to smell the stench
- Audio sensor to listen to the screen & bump.

iv] ERectors (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 characters:

a) Fully observable   d) static

b) Determinstics   E) Discrete

c) Episodic   F) single agent

Q2) Explain various elements of congnitive system.

→ Congnitive computing is a new type of computing with the goal of more accurate models of how the human brain/mind senses, reasons, & 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 user interfaces to adjust content for a particular type of audience.

— Following are elements of Cognitive System:-

a) **Intercutive:** They may interact easily with users so that those users can define their needs comfortably. They may also interat 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) **Lontexual:-** They may understand, identify & extract contexual elements such as meaning syntax, location, appropriate domain etc.

d) **Iteractive & stateful:-** They may aid in defining a problem by asking questions or finding additional source input if a problem statement is incomplete.

Q3) Write note on language model.

→ The goal of a language model is to compute a probability of a taken (e.g a sentence or sequence of words) and are useful in many different NPE 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: $P(w) = P(w_1, w_2, w_3, \ldots w_n)$

– 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:-

– From the markov Assumptions, we can formally define models where $k = n - 1$ as following:-

$$P(w_1 | w_2 w_2 \cdots w_{i-1})$$

c) Unigram model (k=1):-

$$P(w_1 w_2 \ldots w_n) = \prod P(w_i)$$

d) Bigram model (k=2):-

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

$$(w_i | w_{i-1}) = \frac{count(w_{i-1} \cdots w)}{count(w_{i-1})}$$

Q4) Write a note on machine Translation:
→ machine Translation is classic test of language under-
stand It consists of both language analysis and
generation. many machine translation systems have huge
commercial use. Following are few of the examples :-
- Google Translate goes through 100 billion words per
day
- facebook uses to translate text in post and comments
automatically in order to break language barriers.
- systran became the first software provider to laun-
ch a neural machine Translation engine in more than
30 languages in 2016.
- microsoft brigs AI-powered translation to end wers
and developers on Android, ios, and Amazon Fire, whethe
or not they have access to the Internet.
- In a traditional machine translation system, parallel
corpus a collection of is wed to each of wirdth is
translated into one or more other languages than
the original. For example, given the source langua-
ge eg. french and the target languages eg english
multiple statistical models needs to be build, inclu-
ding a probablistic formulation using the Bayesian
Rule, a translation model $p(f|e)$ trained on parallel
corpus and a languge model $p(e)$ trained on the
english corpus
- It is obious that, this approach skips hundereds
of important details, requires a lot of human
feature engineering, & is overall a complex system

Qs) Explain the following terms :-

a) phonology :-
- It is the study of organizing sounds Systematically in a 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 languages. Lexical analysis deals with recognition & identification of structure of sentences. It divides the paragraphs in sentences, phrases & words.

d) Syntactic Analysis :-
- In syntactic Analysis the sentences 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 eat me" will 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.