Assignment No: 1 B

PAGE No.
DATE / /

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PAGE No.
DATE / /

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Q.1. Explain PEAS descriptors for WUMPUS world.

- (i) Performance measure.
+100 for grabbing the goal and coming back to start
-200 if the players is killed.
-1 per action.
-10 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 breely
- Room with gold which is glittery.
- Arrow to shoot the WUMPUS.

(iii) Sensors cassuming a robotic agents.
- Camera to get the view
- Odeour sensor to smell the Stench.
- Audio sensor to listen to the Scream and bump

(iv) ERRectors cassuming 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 (b) Deterministics (c) Episodic

(d) Static (e) Discrete (f) Single agent.

DATE / /

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 ~~Res~~ functioning of the human brain thereby improving human decision making cognitive computing application links data analysis and adaptive page displa i.e 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 those users can define their needs comfortably. They may also interact with other processors, devices and cloud service, 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 ~~req~~ requirements evolve. They ~~many~~ may resolve ambiguity and tolerate unpredictability behaviours.

(c) Contexual :- They may understand, identify and extract contexual elements such as meaning syntax, location, appropriate domain, etc.

(d) ~~It~~ Iterative and stateful :- They may in defining problem by asking questions or binding 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 NLP application.
- 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 :-

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

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

$$P(w_1 w_2 \ldots w_n) = \prod_i p(w_i)$$

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

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

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

PAGE No.
DATE / /

(4) 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 few or the examples:

- Google Translate goes through 100 bilion words per day
- eBay use machine translation techniques to enable crossborder trade and connect buyers / sellers around globe
- Facebook uses (MT) to translate text in posts and comments automatically in order to break language barries.
- Systran become the first software provider to launch a Neural Machine Translation eg 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 OR it is used to each OR width, is translated into one or more other languages than the original. For example, given the source language eg French and the target languag eg English, multiple statistical models needs to be buid including a probabilistic formulation using the regesion Rule, a translation matel P(R)e trained on parallel corpus and a language model p(e) trained on the english corpus.

PAGE No.
DATE / /

- It is obious that, this approch skips hunderad or import details, requir a lot of humon Reature 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 Pricessing) system.

(b) Morphology:-
- It is a studys of constmution of words from primitive meaningful units.

(c) Lexical Analysis:-
Lexicon is the words and phrases in language. lexical analysis deals with the recugnition and identification of structure of sentence. 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 sentences. In this phase the grammar or the sentence is analyzed in order to get relationship among diffrent words in sentences.
For example: I Mango eoh mell will be rejected by analyzer.

(e) word sense disambiguation :-

- while using words that have more ~~than~~ 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.