Assignment no: 1 B

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DOA	DOP	Remark	Sign

1. Explain PEAS descriptors for WUMPUS world.

→ i) Performance measure
- +100 for grabbing the gold and carring back to start
- -200 if the player is killed
- -1 per action
- -10 for using the arrow

ii) Environment
- Empty Room
- Room with WUMPUS
- Rooms neighbouring to WUMPUS which are smelly
- Room with gold which is glittery.
- Rooms with bottomless pits.
- Rooms neighbouring with bottomless pits which are breezy.
- Arrow to shoot the arrow.
- ~~The WUMPUS world agent has following char~~

iii) Sensors (assuming a robotic agent)
- Camera to get the view.
- Odour sensor to smell the stench
- Audio sensor to listen to the screen and 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
b) Deterministics
c) Episodic
d) Static
e) Discrete
f) Single agent.

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 human brain thereby improving human decision making. Cognitive computing applications links data analysis and adaptive page display ie. 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 user so that those users can define their needs comfortably. They may also interact with other processors, devices and cloud services, as well as with people.

b) Adaptive :- They may ~~resolve~~ 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 ~~torate~~ tolerate unpredictability behaviours.

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

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

5. Write a note on language model.

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

- Language model (LM) actually a grammer of language as it gives probability of word that will follow.
- Incase 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 be also used to find 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 on 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 ($K = 2$):-

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

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

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 of the examples :-

- Google Translate goes through 100 billion words per day.
- E-Bay uses machine translation techniques to enables cross-border trade and connect buyers / sellers around globe.
- Facebook uses (MT) to break language barriers.
- System became the first software provider to launch a Neural Machine Translation engine in more than 30 language 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 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 originals for eg. given the source language than the original given the source language eg. french and target language eg. English, multiple statistical models needs to be build including a probabilistic formulation using the reg Bayesian Rule, a translation model $p(f)e$ trained on parrel corpus and 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 resource engineering, and is overall a complex system.

5. Explain the following terms :-

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a) Phonology :-

- It is 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 recognition and identification of structure of sentences. It divides the paragraphs in sentences, phrases and words.

d) Syntactic Analysis :-

- In syntactic Analysis is the sentences are parsed as noun, verbs, adjective and other parts of sentences. In this phase the grammar of sentence is analyzed in order to get relationship among different words in sentences. For eg: "Mango eats me" will be rejected by analyser.

e) Word Sence Disamlaguation :-

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 online resource such as word net.