

## ASSIGNMENT :- 1 (B)

NAME:-

Khan Zarrar Husain Zakir Husain

Roll No.:-

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Class :- BE - IT

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Subject :- Artificial Intelligence (AI)

<u>DOP</u>	<u>DOA</u>	<u>Marks</u>	<u>Sign</u>

① Explain PEA's description for WUMPUS world.

1) Performance Measure:

- +100 for grabbing the gold & coming back to start.
- 200 if the player is killed
- 1 per action
- 10 for using the arrow.

2) Environment:

empty rooms

room with wumpus world

rooms neighbouring to wumpus which are smelly

rooms with bottomless pits

room neighbouring with bottomless pits which are breezy.

room with gold which is glittery.

arrow to shoot the wumpus

3) Sensors (assuming a robotic agent)

camera to get the view

odour sensor to smell the stench

audio sensor to listen to the screen & bumb

4) 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 characters.

- a) fully observable
- b) deterministic
- 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 & responds to stimulus. Generally, the term cognitive computing is used to refer to new hardware &/or software that mimic the functioning of the human brain thereby improving human decision making. Cognitive computing applications links data analysis and adaptive page display. i.e. adaptive user interfaces, to adjust content for a particular type of audience.

Following are elements of cognitive systems:

### a) Interative:-

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 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 & requirements evolve.

They may resolve ambiguity & tolerate unpredictability behaviours.

c) Contextual +

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

d) Interactive & stateful:

They may aid in defining a problem by asking questions or finding additional source input if a problem statement is incomplete.

(3) Write a note on language model.

- > The goal of a language model is to compute a probability of a token and are useful in many different NLP applications.
- > Language model (LM) is actually a grammar of language as it gives the probability of word that will follow.
- > In case of LM, the probability of a sentence as sequence of word is  $p(w) = p(w_1, w_2, \dots, w_n)$   
 $p(w) = p(w_1, w_2, w_3, \dots, w_n)$
- > It also can 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 models available:-

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 current state.

b) N-gram Models:

from the Markov assumptions, we can formally define models where  $k=n-1$  as follows:

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

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

$$P(w_1, w_2, \dots, w_n) = \prod_i P(w_i)$$

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

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

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

(4)

Write a note on Machine Translation

Machine Translation is a classic test of language understand. It consists of both, language analysis & generation. Many machine translation systems has huge commercial use.

Following are few of examples:-

- Google Translate goes through 100 billion words per day.
- E-Bay uses machine translation techniques to enable cross-border trade or connect buyers/sellers around globe.

- > Facebook uses machine translation to translate text in posts & comments automatically in order to break language barriers..
- > Microsoft brings AI-powered translation to end users or developers on android, ios and Amazon fire, whether or not they have access to internet .
- > In traditional machine Translation system, parallel corpora a collection of texts is used to each of width , is translated into one or more other languages than original.
- > It is obvious that this approach skips hundreds of important details requires a lot of human feature engineering and is overall a complex system.

### (5) Explain following Terms.

#### (a) Phonology -

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

#### (b) Morphology -

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

#### (c) Lexical Analysis -

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

## (d) Syntactic Analysis:

In this, sentences are parsed as noun, verbs, adjectives & other parts of sentences. In this phase, grammar of sentence is analyzed in order to get relationship among different words in sentence.

e.g. 'Mango eats me' will be rejected by analyzer.

## (e) Word sense disambiguation

## (e) word-sense disambiguation

While using words that have more than one meaning we have to select meaning which makes the most sense in context. For e.g. we are typically given list of words associated word senses e.g. from dictionary or from an online resource such as word net.