

ASSIGNMENT NO: 1B.

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Subject : A.I

DOA

DOP

REMARK

SIGN

Q 1) Explain PEAS descriptors for wumpus world

1) Performance measure.

- +100 for grabbing the goal and coming back to start

- 200 if the player is killed.

- -1 per action

- -10 for using arrow

2) Environment

- Empty Rooms

- Room with wumpus

- Rooms neighbouring to wumpus which are smelly

- Rooms with bottomless pits

- Rooms neighbouring with bottomless pits which are green

- 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 stench

- Audio sensor to listen to the screen & lamp.

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 characteristics

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 and responds to stimuli. Generally, the term cognitive computing is used to refer to new hardware, software or software that mimics the following functioning of the human brain thereby improving human decision making. Cognitive computing is used in applications like data analysis & adaptive page displays, adaptive user interfaces to adjust context 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 need 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 and 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) Iterative and stateful : They may end in defining a problem by asking question or finding additional source input if a problem statement is incomplete.

3) Write note on language model

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

- language model (LM) actually a grammar of a language, as it gives the probability of a sentence as sequence

- 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

$$P(W_{n+1} | W_1, W_2, W_3, W_4)$$

- A model that computes either of these is language model.

- There are various language models available, a 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 state depends upon present state.

b) N-gram models:

From the Markov Assumptions, we can formally define models where

$k = n-1$ as following.

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

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 classic of language understanding. 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.
- Ebay uses machine translation techniques to enable cross border trade and connect buyers / sellers around globe.
- Facebook uses (MT) to translate text in post and 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 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 or a collection of traces is used to each of which is translated into one or more other languages than the original.
- It is obvious that this approach skips hundred of details & it's a complex structure.

EXPLAIN THE 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 and phrases in language. Lexical analysis deals with the recognition and 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 and other parts of sentences. In this phase the grammar of the sentence is analysed in order to get relationship among different words in sentences for example "mango eat 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 senses e.g. from a dictionary or from an online resource such as wordnet.