

[illegible]

Name:- sagar .k. Rajguru

Roll no: 51

Beuten:- I3

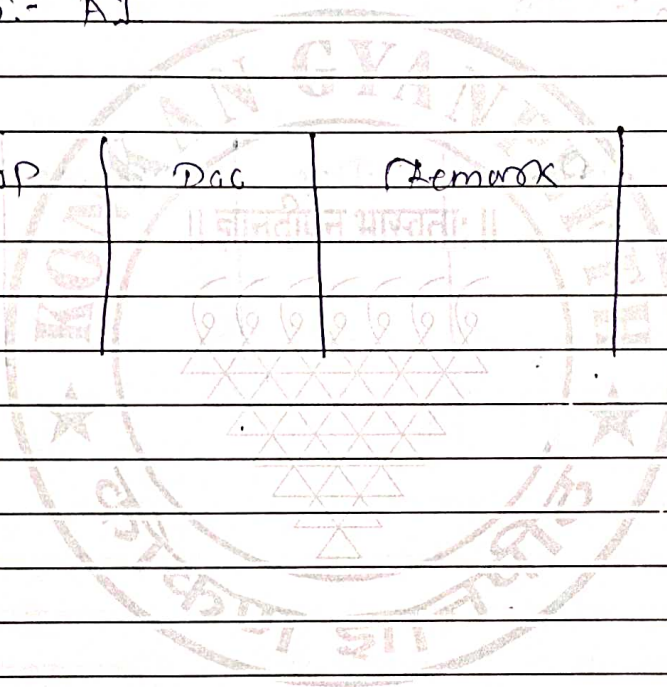
Sub:- AI

Daf

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Remark

Sign



Q1) Explain PEAS descriptors for wumpus world

- i) Performance measure

- +100 for grabbing the gold and 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

- Rooms neighbouring to wumpus which are smelly

- Rooms with bottomless pits

- Rooms neighbouring with bottomless pits which are breezy

- Room with gold which is glittery

- Arrow to shoot 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 and hump.

iv) 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







Q3) 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 used in many different NLP 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:-  $P(w) = P(w_1, w_2, w_3, \dots, w_n)$
- It can also be used to find the probability of the next word in sentence:  $P(w_{n+1} | w_1, w_2, w_3, \dots, w_n)$
- 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:-

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

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

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

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

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

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



Q4) write a note on Machine Translation:-

- Machine Translation is classic test 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 posts 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 a collection of ~~tree~~ is used to each of which is translated into one or more other languages than the original. For example, given the source language eg. French and the target language eg. English, multiple statistical models need to be built, including a probabilistic formulation using the Bayesian Rule, a translation model  $p(f|e)$  trained on parallel corpus, and a language model  $p(e|p(e))$  trained on the English corpus.
- It is obvious that, this approach skips hundreds of important details, requires a lot of human feature engineering, and is overall a complex system.



Q5) Explain the following 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 and 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 ~~re~~ 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 wordnet.