K.G.C.E.
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AI Assignment No. 1B

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Q1 — Explain PEPS descriptions for wumpus's world

i) Performance measure
→ +100 for grabbing the goal 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.
→ Room neighbouring to wumpus which are smelly.
→ Room with bottomless pits.
→ Room neighbouring with bottomless pits which are breezy.
→ 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 scream and bump.

iv) Effectors (assuming a robotic agents)
→ motor to move left right.
→ Robot arm to move left right.
→ Robot mechanism to shoot the arrow.

Date :

The wumpus world agent has following characters :-

a) Fully observable
b) Deterministics
c) episodic
d) static
e) Discrete
f) single agent

Q2. Explain various elements of cognitive system.

① 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 the mimic the following functioning of the human brain thereby improving human decision making cognitive computing application links data analysis and adaptive page display Adaptive user interface, to adjust content For a particular type of audience.

② 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 be engineered to feed on dynamic data in real time they may learn as information changes as goals requirement evolve. They may resolve ambiguity and 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 a problem by asking question or finding additional sources input if a problem statement in incomplete.

Q3. Write note on language model.

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

→ language model (LM) actually a grammer 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 :-

$P(W) = P(W_1, W_2, W_3, W_4 \ldots W_n)$

→ 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 as a 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 :-

$P(W_1 / W_1 W_2 \ldots W_{i-1})$

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

$P(W_1 W_2 \ldots W_n) = \prod_i P(W_i)$

d) Bigram model (k=2) :-

$$P(w_i / w_1 w_2 \cdots w_{i-1}) = P(w_i / w_{i-1})$$

$$(w_1 / w_{i-1}) = \frac{\text{count}(w_{i-1} \cdots w)}{\text{count}(w_{i-1})}$$

Q4. write a note on Machine Translation.

→ Machine Translation is classic test of language understand. It consist of both language analysis and generation many machine translation system have huge commerical use. following are few of the examples :-

(a) Google Translate goes through 100 billion words per days.

(b) eBay uses machine translation techniques to enable crossborder trade and connect buyer sellers around globe.

(c) facebook uses (MT) to translate text in post and comment automatically in order to break language barriers.

(d) System become the first software provider to launch a Neural machine Translation engine in more than 30 languages in 2016.

(e) microsoft brings AI - powered translation to end users and developers on Androids, ios, and amazon fire, whether or not they have access to the internet.

(f) In a traditional machine Translation system parallel corpus a ~~to~~ collection of tacess is used to each of width, is translated into one or more other languages than the original. for examples given the source language e.g. french and the target language e.g english, multiple satisfied models need to be build, including a probibilistic formulation using the Bayesian Rule, a translation model p(f)e trained on parallel corpus and a languge model p(e) trained on the english corpus

(g) It is obious that, this approch skips hundreds of important details, requires a lot of human features engineering and it 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 word from primitive meaningful units.

(c) Lexical Analysis :-
lexical is the words and phrases in language, lexical analysis deals with the recognition and identification of structure of sentences. It divides the paragraph in sentences, phrases and words.

(d) Syntatic Anlysis :-
- In syntatic Analysis the sentences are parsed as noun, verbs, adjective and other parts of sentences. In this phase the grammer of the sentence is analysed in order to get relationship among different words in sentences.

(e) word sense disambigution :-
- While using words that have more than one meaning we have to resect the meaning which makes the most sense in context. For example, we are typically given a list of words associated word sense eg. from a dictionary or from an online resource such as word net