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DOA DOP Remark Sign

1 Explain PEAS descriptors for wampus world.

Performance measure:

+ 1000 reward points if the agent comes out of the cave with gold.

- 1000 points penalty for being eaten by the wampus or falling into the pit.

-1 for each action and -10 for using an arrow.

The game ends if agent dies or came out of the cave.

Environment:

A 4×4 grid of rooms.

The agent initially in room square $[1, 1]$ facing toward the right.

Location of wampus and gold are chosen randomly except the first square $[1, 1]$.

Each square of the cave can be a pit with probability 0.2 except first square.

Actuators:

Left turn, right turn, move forward, grab, release, shoot.

Sensors:

The agent will perceive the stench if he is in the room adjacent to the wampus.

The agent will perceive breeze if he is in room directly adjacent to pit.

Agent will perceive glitter in room where gold is present.

Agent will perceive bump if he walks into a wall.

When wumpus is shot, it emits a horrible scream which can be perceived anywhere in the cave.

These percepts can be represented as five element list, in which we will have different indicators for each sensor.

Example if agent perceives stench, breeze, but no glitter, no bump and no scream then it can be represented as: [Stench, Breeze, None, None, None].

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 or software that mimic the following 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 the elements of cognitive system.

Adaptive - This is the first step in making a machine learning based cognitive system. The solutions should at mimic the ability of human brain to learn and adapt from the surroundings. The systems can't be programmed for an isolated task. It needs to be dynamic in data gathering, understanding goals and requirements.

Interactive - Similar to brain the cognitive solution must interact with all elements in the system - processor, devices, cloud service and user. It should understand human input and provide relevant results using NLP and deep learning.

Iterative and stateful - The system should remember previous interactions in a process and return info that is suitable for specific application at that point of time. It should be able to define the problem by asking questions or finding an additional source.

Contextual - They must understand, identify and extra contextual elements such as meaning, syntax, time, location, appropriate domain, regulations, user's profile, process, task and goal.

3 Write note on Language model.

→ Language modeling (LM) is the use of various statistical and probabilistic techniques to determine the probability of a given sequence of words occurring in a sentence.

Language model analyze bodies of text data to provide a basis for their word predictions. They are used in natural language processing applications, particularly ones that generate text as an output. Some of these applications include machine translation and question answering.

Model types -

Unigram - a unigram model can be treated as the combination of several one-state finite automata. It splits the probabilities of different terms in a context.

N-gram - From assumptions, we can formally define models where $k = n-1$ as following:-

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

Bidirectional - Unlike n-gram models, bidirectional analyse text in both directions i.e. forward and backwards.

4 Write short note on Machine Translation.

→ Machine translation is the automatic translation of text from one natural language (the source) to another (the target).

It was one of the first application areas envisioned for computers but it is only in the past decade that the technology has seen widespread usage. Here is a ^{sentence} passage from page. *

"AI is one of the newest fields in science and engineering."

And here it is translated from English to Danish by an online tool, Google Translate:

"AI er en af de nyeste områder inden for videnskab og teknik."

Historically, there have been three main applications of machine translation. Rough translation, as provided by free online services, gives the "gist" of a foreign sentence or document, but contains errors! Pre-edited translation is used by companies to publish their documentation and sales materials in multiple languages. The original source text is written in a constrained language that is easier to translate automatically, and the results are usually edited. Restricted-source translation works fully automatically, but only on highly stereotypical language, such as a weather report.

5 Explain the following terms:

→ Phonology -

This is ^{the} the level of sounds. One must distinguish here the set of possible human sounds, which constitutes the area of phonetics proper, and the set of system sounds used in given human language, which constitutes the area of phonology. It is the study of organizing sounds systematically in an NPL system.

Morphology -

This is the level of words and endings, to put it in simplified terms. It is what one normally understands by grammar. The term morphology refers to the analysis of minimal forms in language which are however, themselves comprised of sounds and which are used to construct words which have either grammatical or lexical function.

Syntactic Analysis -

In Syntactic analysis the sentences are parsed as noun, verbs, adjective and other parts of sentence. In this phase the grammar of the sentence is analysed in order to get relationship among different words in sentences.

Word Sense Disambiguation -

It is an important method of Natural

Language Processing by which the meaning of a word is determined, which is used in particular context. NLP system often face the challenge of properly identifying words and determining the specific usage of a word in a particular sentence has many applications. Word sense Disambiguation basically solves the ambiguity that arises in determining the meaning of the same word used in different situations.

Lexical analysis -

It involves identifying and analysing the structure of words. Lexicon of a language means the collection of words and phrases in a language. Lexical analysis is dividing the whole chunk of text into paragraphs, sentences and words.