# Assignment No. 1B

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Q.1) Explain PEAS descriptors for WUMPUS World

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

② Environment
- Empty rooms
- Rooms neighbouring to WUMPUS which are smelly.
- Rooms with bottomless pits
- Rooms neighbouring with bottomless pits which are breezy.
- Rooms with gold which is glitery.
- 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 & bump.

④ ~~EFFo~~ 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:

ⓐ Fully observable
ⓑ Deterministics
ⓒ Episodic
ⓓ stahc
ⓔ Discrete
ⓕ single agent.

Q.2) Explain various elements of congnitive system.

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- congnitive computing is a new type of computing with the goal of more accurate models of how the human brain / mind sense, reasons, & responds to stimulus. Generally, the term congnitive computing is used to refer to new hardware and/or software that mimic the following functioning the human brain thereby improving human decision making. Congimitive computing applications links data analysis & adaptive page display i.e. Adaptive users interfaces, to adjust content for a particular type of audience.
- Following are elements of congnitive system :

ⓐ Interactive :

- They may interact easily with users so that those users can define ~~each other~~ their needs comfortably. They may also interact with other processors, devices & cloud services, as well as with people.

ⓑ Adaptive

- They may be engineered to feed on dynamic data in real time. They may learn as information changes & as goal & requirements evolve. They may resolve ambiguity & tolerate unpredictability behaviours.

ⓒ contexual

- They may understand, identify & extract contexual elements such as meaning syntax, location, appropriate domain, etc.

ⓓ Interactive & stateful

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

Q.3) Write Note on Language Model

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- The goal of language model is to compute a probability of a token (e.g.- a sentence or sequence of word) & are useful in dif many different NPL applications
- Language model (LM) actually a grammer of language as it gives the probability of word that will follow.
- In case of (LM) probability of a sentence as sequence of words is :- $P(w) = P(w_1, w_2, w_3, \ldots\ldots w_n)$
- It can also be used to find the probability of the next word in sentence : $P(w_5 | w_1, w_2, w_t)$
- A model that computes either of these is Language Model.
- There are various Language Models are available, a few are :

ⓐ Methods using markov assumptions

- A process which is stochastic in nature, its said to have the Markov property, if the conditional probability of future states depends upon present state.

ⓑ N-gram Model

- From the Markov assumptions, we can ~~following~~ formally define models where $k = n-1$ as following :

$$P(w_1 | w_1\ w_2 \ldots\ldots w_{i-1})$$

ⓒ Unigram Model ($k=1$)

$$P(w_1 w_2 \ldots\ldots w_n) = \prod_i P(w_i)$$

ⓓ Bigram Model ($k=2$)

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

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

Q.4) Write a Note on Machine Translation

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- Machine Translation is classic test of language understand. It consists of both language analysis & generation. Many ~~tran~~ machine translation ~~s~~ytem 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 & connect buyers / sellers around globe.
  - Facebook uses (MT) to translate text in posts & comments automatically in order to break language barriers.
  - systran became the first software provider to launch a neural Machine translate engine in more than 30 langyge in 2016.
  - Microsoft brings AI - powered translation to end users & developers on Android, ios and Amazon Fire, whether or not they have access to the internet.
- In a traditional Machine translation system, parellel corpus a collection of trees is used each of width, is translated into one or more other languages than the original. For e.g. - given the ~~sorte~~ source language e.g. English, multiple statistical models needs to build, including a probabilistic formulation using the Bayesian Rule, a translate model P(f|e) trained on parallel corpus & a language model P(e) trained on the English corpus.
- It is obvious that, this ~~is~~ approach skips hundreds of important details, requires a lot of human ~~Re~~ature engineering, & is overall a complex system.

Q.5) Explain the following terms

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ⓐ Phonology
- It is the study of organizing sound systematically in an NLP (Natural Language processing) system.

ⓑ Morphology
- It is a study of construction of words from primitive meaningful units.

ⓒ Lexical analysis
- Lexicon is the word & phrases in language. Lexical analysis deals with the recognition & identification of structure of sentences. It divides the paragraphs in sentences, phrases & words.

ⓓ Synatic Analysis
- In synatic analysis the sentences are parsed as noun, verbs, adjective & other parts of sentences. In this phase the grammer of the sentence is analyzed in order to get relationship among different words in sentences.
For e.g. - "Mango eats me" will be rejected by analyzer.

ⓔ Word sense Disambiguation
- While using words to at 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 word associated word senses ~~eg~~ ceg from a dictionary or from an online resource such as word net.