Assignment No:-1B

Name: Siddhesh S. Sawant

Roll No: 58

Sem/Branch: VII/I.T.

Batch: I3

Subject: A.I.

DOP	DOA	Marks	Sign

Q.i) Explain PEAS descriptions for WUMPUS world

⇒ i) Performance measure
- +100 for grabbing goal and coming back to start
- -200 if player is killed
- -1 per action
- -10 for using 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 glitery
- Arrow to shoot WUMPUS.

(iii) Sensors (assuming Robotic Agent)
- Camera to get the view
- odour, ~~Sensor to listen to scream~~ and bam
- odour sensor to smell
- audio sensor to listen to scree & bump.

iv) Effectors (assuming robotic agent)
- Motor to move left Right.
- Robot arm to grab
- Robot Mechanism to shoot arrow.

WUMPUS world agent has following characters:

a) Fully Observable
b) Deterministics
c) Static
d) Discrete
e) Single Agent.

(Q.2) Explain Various elements of Cognitive System

→ ① Cognitive Computing is new type of Computing with goal of more accurate models of how human brain/mind senses, reasons, and responds to stimulus.

② Generally, term Cognitive Computing is used to refer to new hardware and/or software that mimic following functioning of human brain thereby improving human decision making. Cognitive Computing applications links data Analysis & Adaptive page i.e. Adaptive user interfaces to adjust content for 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 needs comfortably. They may also interact with other processors, devices & 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 & requirements

evolve. They may resolve ambiguity and tolerate unpredictability behaviours.

c) Contextual:

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

d) Iterative & State

- They may used in defining a problem by asking questions or finding additional source input if problem statement is incomplete

Q.3) Write Note on language Model.

→ ① Goal of ~~lang~~ language model is to Compute probability of token (eg. sentence or sequence of words) & are useful in many different NPL Applications.

② language model actually a grammar of a language as it gives probability of word that will follow.

③ In case of (LM) probability of a Sentence as sequence of words is:
$P(w) = P(w_1, w_2, w_3, \ldots w_n)$

④ It can also be used to find probability of next word in sentence: ~~P(ws/w...~~
$P(w_5 | w_1, w_2, w_3, w_4)$

⑤ A model that computes either of these is language Model.

⑥ * 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 markov property if conditional probability of future states depends upon present state.

b) N-Gram models:
- From Markov assumptions we can formally define models where $K = n-1$ as following.

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

c) Unigram model ($K=1$) :-

$$P(w_1 w_2 \ldots w_n) = \prod_{i} P(w_i)$$

d) Bigram model ($K=2$) :-

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

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

Q4) Write a note on Machine Translation?

→ Machine Translation is classic test of language understand It consist of both languages analysis and generation. Many machine translation system have huge commercial use Following are few of 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 Machine Translation to translate text in posts and comments automatically in order to break langugage barriers.
- Systran became 1st software provider to launch a Machine Translation engine in more than 30 language 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 Internet.
- In traditional Machine Translation system, parallel corpus a collection

of trees is used to each of width, is translated into one or more other languages than original, for eg, given source language eg. French and target language eg. English, multiple stastical models needs to be build, including a probablistic formulation using translation model $p(f|e)$ trained on parallel Corpus and language model $p(e)$ trained on english Corpus.

- It is obvious that this approach skips hundreds of important details, requires alot of human feature engineering and is overall a Complex System.

Q.5) Explain following terms:

a) Phonology:
- It is study of organizing sounds systematically, in an NLP (Natural language Processing) System.
- An example of Phonology is study of different sounds and way

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

c) Lexical Analysis:
- lexicon is words and phrases in language. lexical Analysis deals with recognition & identification of structure of sentences. It divides paragraphs in sentences, phrases and words

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

- eg. Mango eats me' will be rejected by analyzer.

e) Word sense disambiguation:-
- While using words that have more than one meaning we have to select meaning which makes most sense in context. For eg., we are typically given list of words associated word senses eg. From dictionary or from an online Resource such as wordnet