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Q I)

a) Standard logical equivalence

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(1) Distributivity for $\wedge$ and $\vee$.

$$(\alpha \vee (\beta \wedge \gamma) \equiv (\alpha \vee \beta) \wedge (\alpha \vee \gamma)$$

$$(\alpha \wedge (\beta \vee \gamma) \equiv (\alpha \wedge \beta) \vee (\alpha \wedge \gamma)$$

(2) Associativity for $\wedge$ and $\vee$

$$(\alpha \vee (\beta \vee \gamma)) \equiv ((\alpha \vee \beta) \vee \gamma)$$

$$(\alpha \wedge (\beta \wedge \gamma)) \equiv ((\alpha \wedge \beta) \wedge \gamma)$$

(3) De morgan's for $\wedge$ and $\vee$

$$\neg(\alpha \wedge \beta) \equiv (\neg\alpha \wedge \neg\beta)$$

$$\neg(\alpha \vee \beta) \equiv (\neg\alpha \vee \neg\beta)$$

2

(4) Contraposition.

$$(\alpha \rightarrow \beta) \equiv$$

[redacted]

$$(\neg\beta \rightarrow \neg\alpha)$$

1

b) Challenges of Federated Learning.

(1) Since Data privicy is very main purpose of Federated Learing, Transperency is the challenge.

(2) Since Data Privacy is a concern, we can trust everyone contributing in this since not everyone has same intention.

(3) Computation costing & resource is a challenge

(4) Federated Learing is a new field & still lot of things are unknown to the community..

5] Explain following related with XAI.

a)

(1) RETAIN (Reverse Time Attention mechanism)

- RETAIN falls under ante-hoc technique of XAI.
- RETAIN comprises of 2 recurrent neural networks with attention mechanism.
- Attention mechanism helps the model to explain why this decision was chosen
- This was developed for health care industry.

(2) LIME (Local Interpretable Model-Agnostic Explanation)

- LIME falls under post-hoc technique.
- Post-hoc techniques involve testing stages
- LIME generates a new refined dataset from the dataset on which it has been trained.
- It intreprets itself on this new dataset
- Lastly LIME trains a model on this new dataset to extract key features.
  or explain new.

(3) BETA (Black Box Explanation through transparent Approximation)

- This comes under the post-hoc techniques of XAI
- In this process, the testing process is done Transparently (like the name suggests)
- So this XAI shows all the steps carried out by the neural network transparently for programer to understand.

(3)

b] Edge AI VS Cloud AI.

- Edge AI is the process where servers and computation are all situated & processed on the edge of the device.

  Cloud AI is the process where servers and computations are all done on the Cloud using IOT.

- Edge AI is a new ~~technig~~ technology.

  Cloud AI is already used widely.

- Edge AI will replace Cloud AI.

  Cloud AI has ~~the~~ limitations ~~of~~ ~~pri~~ so it can be replaced but not immediately.

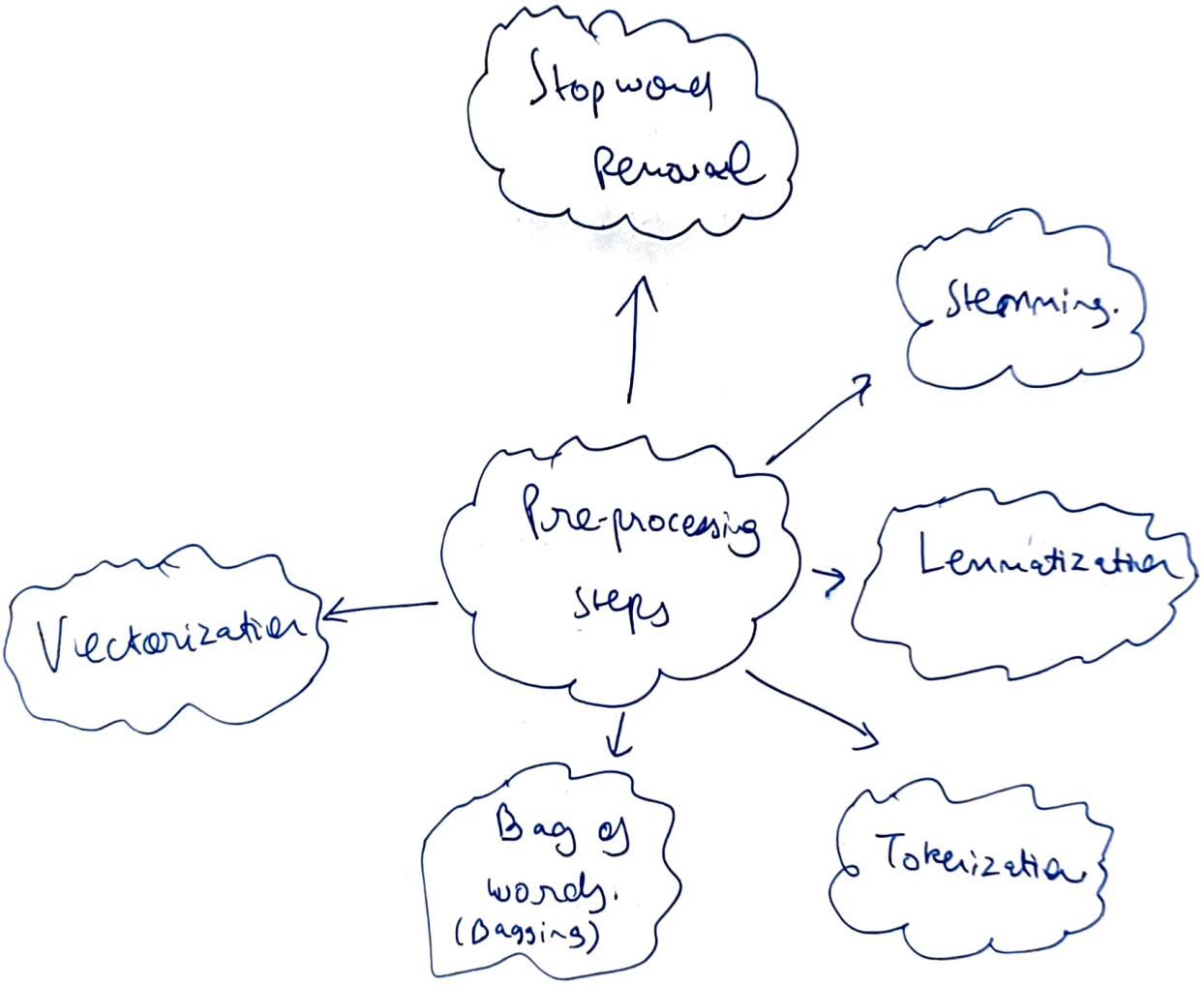
  Certain

- The challenges of Edge AI is, that Robust & powerfull processing techology is still not built so that Edge AI can be widely used in action; it will require lot of computation & processing.
- The challenge of Cloud AI is "Privacy", servers can be hacked & data can be leaked due to which problem arise.
- Example of Edge AI is, A coffee pot with its own server & AI & knows what to do on the users demand., self driving cars. etc.
- Example of Cloud AI, Weather monitoring systems, IOT devices (All of them mostly).

(2)

Q3] Steps of preprocessing of Text.

→ NLP is the field which requires pre-processing of the Text so that the machine can understand the text and do operations on the text.



1. Stopword Removal → This is the process of removing the unwanted words from the sentence eg: and, or, of, to

2. Stemming - This is the process of extracting the "ing" part from the sentence, or bringing to its original form.
   eg: playing → play.

3. Lemmatization – This is the process of extracting (filter) the base word from word.

4. Tokenization – This is the process to give token (identities) to the words in a sentence.

5. Vectorization – This is the process of converting the word into a vector (giving it a mathematical number) for computing.

6. Bagging - Bagging is a famous NLP technique to process words with respect to their meaning.

Q2] what is reasoning.

→ Reasoning is the process of Machine to infer ~~~~ on the operations & make decisions.

① Lets discuss Logical Reasoning.

Logical Reasoning consists of 2 methods / techniques.

① Propositional Logic

② First ~~~~ order Logic

- Propositional Logic — This is a technique where the machine ~~~~ returns an answer in boolean formats.

The challenge here is it cannot answer questions like how, why, all, some etc. or can say it cannot express. eg: Today is ~~~~ and raining.

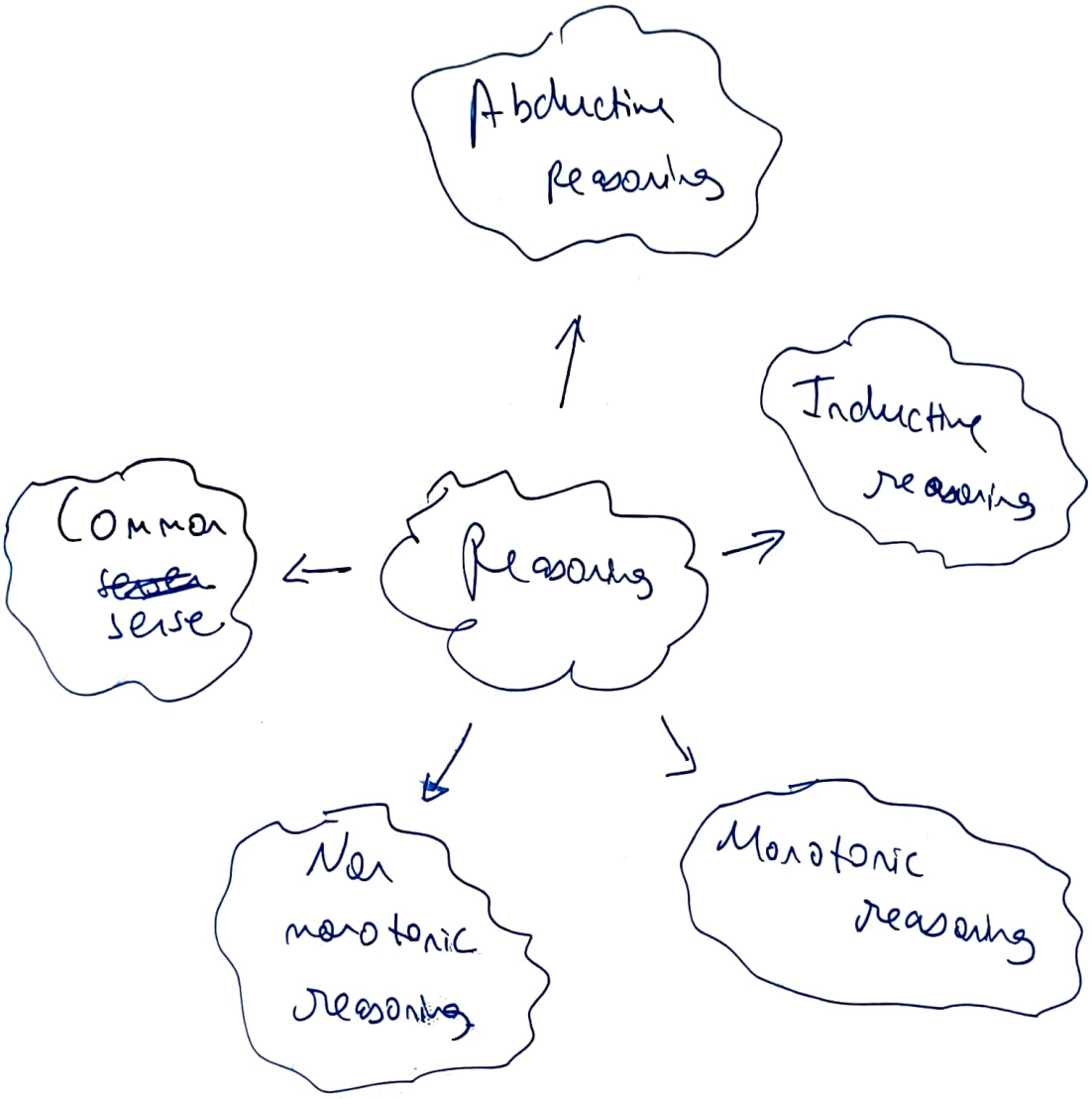
- First order Logic — This is an extension of Propositional where it can express using quantifiers like . All, Some etc

All - ∀ eg: Everybody loves somebody

Some - ∃

$\forall x \exists y$

we can express in this case.


Abductive reasoning
Inductive reasoning
Common sense
Reasoning
Non monotonic reasoning
Monotonic reasoning