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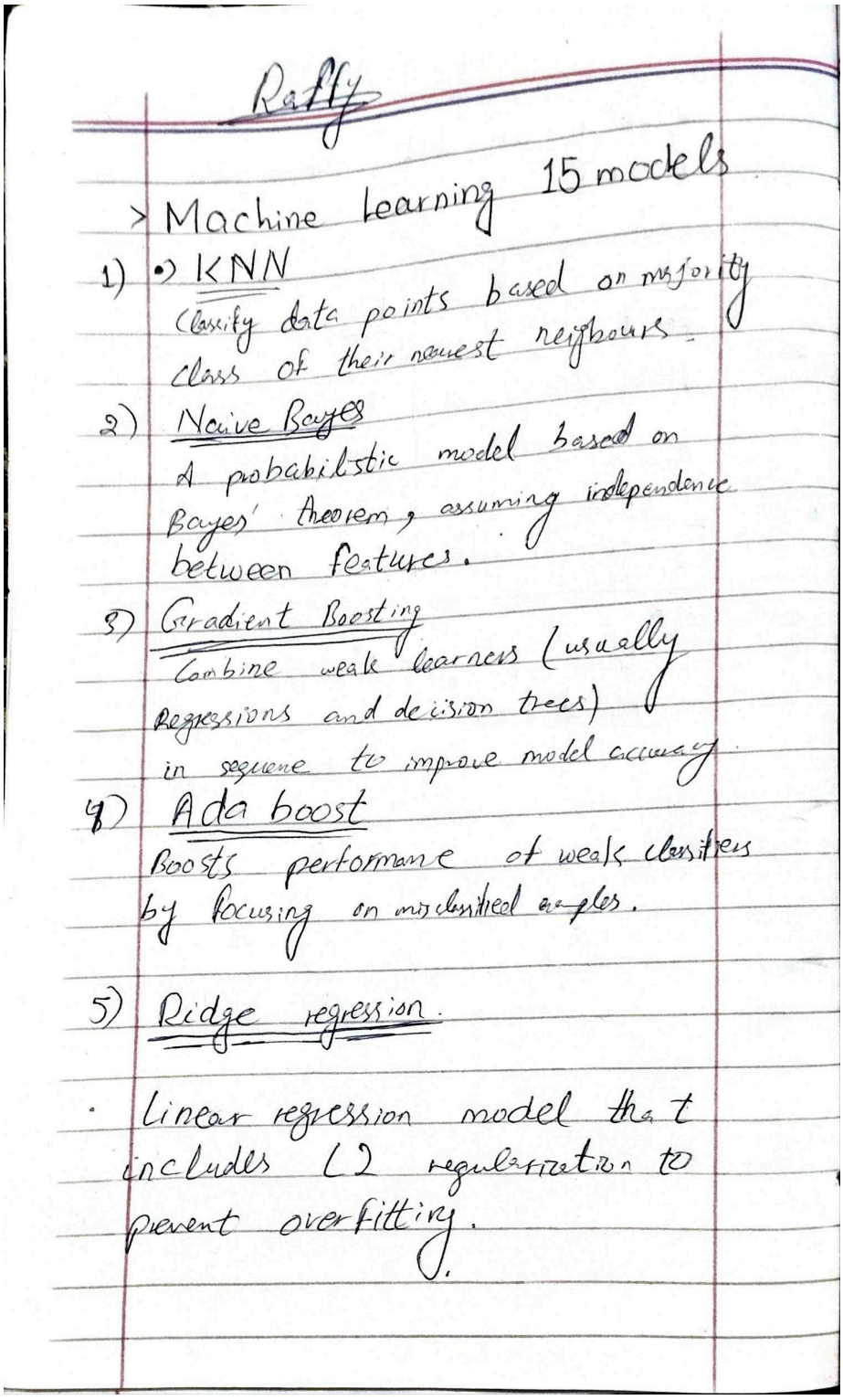
W25-PAK-INP-AI-16

Machine Learning 15 models



6) Random forest

Combines multiple decision trees to improve prediction accuracy and reduce overfitting.

7) Support vector Machine (SVM)

Finds the hyperplane that best separates classes in feature space.

Unsupervised Learning

8) Hierarchical clustering

Build tree-like hierarchy of clusters by merging or splitting them.

9) K-Means clustering

Groups data into clusters based on similarity or distance.

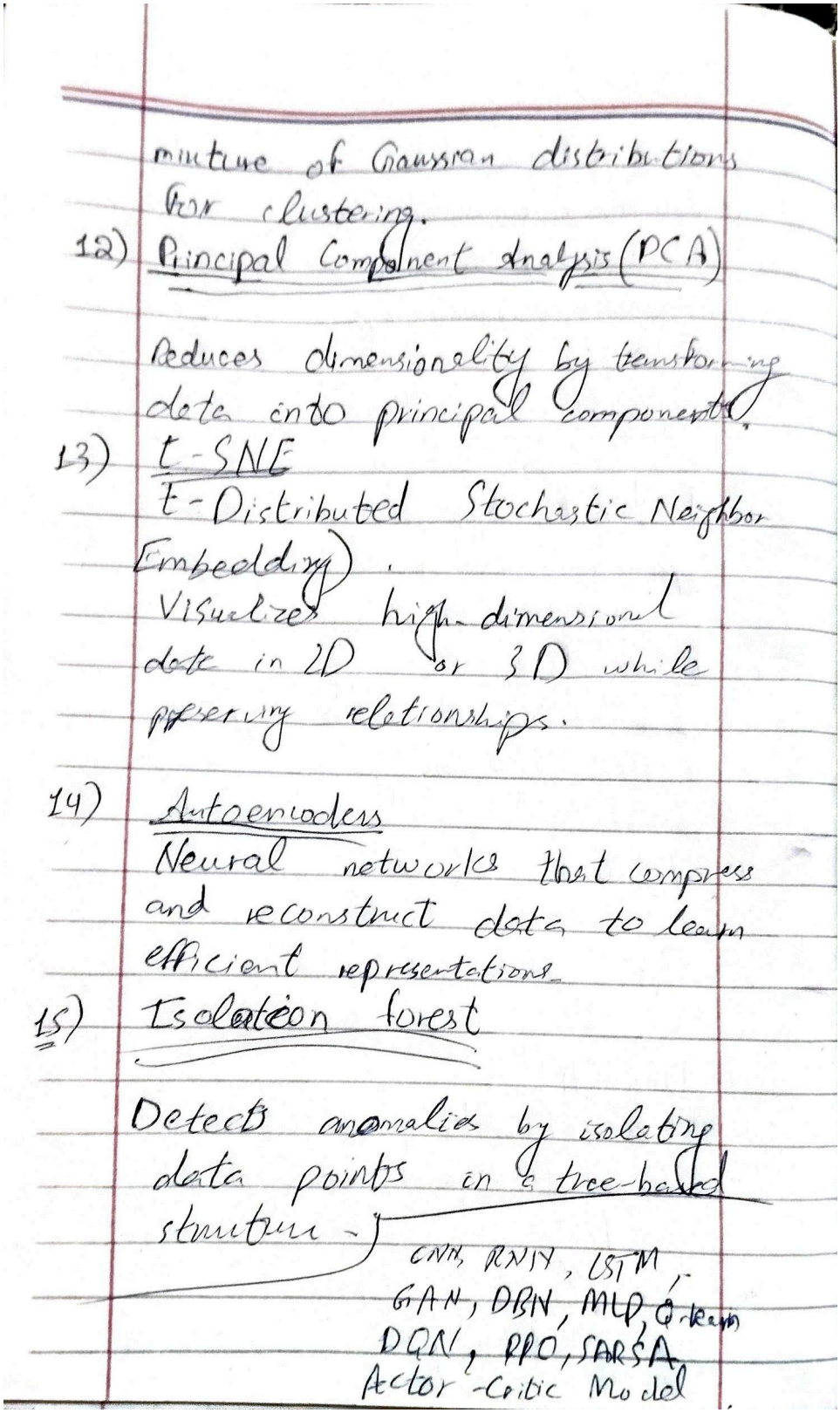
10) DBSCAN

(Density-Based Spatial Clustering

⇒ Groups data points based on density, indentifying noise as outliers (error).

11) Gaussian Mixture Model (GMM)

Assuming data points bersed on



Deep learning 15 models

Deep-learning (CO Models)

(CNNs) Convolution neural network

1.) **LeNet**
Earliest CNNs, handwritten digit recognition.

2) **Inception**
Google Net: Inception modules with multiple filter sizes to capture diverse features.

3) **VGGNet**
Uses very deep networks with small convolution filters for image classification.

4) **ResNet**
Residual connections to solve vanishing gradient problem.

5) **Alex Net**
A deep CNN that popularized deep learning ~~filters for image classification~~ with its success in the imageNet competition.

Recurrent Neural Networks (RNNs)

6. **Vanilla RNN**

Processes sequential data but suffers from short-term memory limitations.

7. **LSTM** (Long-Short-Term memory)

Overcomes the vanishing gradient issue by maintaining long-term dependencies.

8- **GRU** (Gated recurrent Unit)
A simplified version of LSTMs with few parameters.

9- **Transformer** (Transformer based)
Introduces attention mechanisms for parallel processing of sequences.

10- **BERT** (Bidirectional Encoder Representations from Transformers)
A pre-trained transformer model for natural language understanding

11- GPT
Generative Pre-Trained Transformer
A transformer model for text generation and understanding.

Hybrid models (Special)

12- Deep Q-Network (DQN)
Combines deep learning with reinforcement learning to play games.

13- Deep Belief network (DBN)
A stack of restricted Boltzman machine for unsupervised learning.

14- ESN (Echo state Network)
A type of RNN designed for fast learning with fixed internal weight

15- Deep speech
An end-to-end deep learning model for auto-speech recognition.

others: IVTM, (Generative = GAN, DCGAN, Cycle GAN, Style GAN, VAE, Transformer = TS, VIT