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Research Assignment #1

Hope to Skills

Free Artificial Intelligence Advance Course

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Submission:

- Submit a .**pdf** file detailing all the information. No other format will be accepted
- Submission file should be named as **Research_Assignment_01_StudentName.pdf**
- Deadline for this Assignment is **Tuesday 20-02-2024.**
- Strictly follow the submission deadline.
- Make Submission in the **Research Assignment 1** Google Form and press the submit button.
- Click here to submit the Assignment

Solve the Following Task

1. Explain the concept of **Logistic Regression** as a classification model. Discuss its application in a real-world scenario of your choice. For example, you might consider its use in predicting customer churn in telecommunications. Additionally, create or find an image that illustrates the logistic regression process or decision boundary. **(10 Marks)**
2. Describe the **Decision Tree Classification Model**. Provide an example of its application, such as in loan approval processes in the banking sector. Include an image that demonstrates a simple decision tree or its structure in the context of your chosen example.**(10 Marks)**
3. Explain the **Random Forest Classification Model** and how it differs from and improves upon a single decision tree. Illustrate its use in a specific application, like predicting disease outbreaks in healthcare. Provide or create an image that helps visualize the concept of a random forest model.**(10 Marks)**
4. Discuss the **Gradient Boosting Classification Model**, highlighting its strengths and how it operates. Choose a practical example, such as fraud detection in financial transactions, to explain its application. Include an image that helps in understanding the gradient boosting process or its mechanism.**(10 Marks)**
5. Explain what **Ensemble Models** are and how they work. Provide an example of an ensemble model other than Random Forest, and describe how it can be used to improve prediction accuracy.**(10 Marks)**
6. Discuss the role of **Activation Functions** in machine learning models. Give examples of at least two different activation functions and explain where they are typically used.**(10 Marks)**
7. Explain what **Gini** impurity is and how it is used in decision tree algorithms. Provide an example to illustrate your explanation.**(10 Marks)**
8. Describe the concepts of **Entropy** and information gain in the context of decision trees. How do these concepts guide the creation of a decision tree?**(10 Marks)**
9. Explain what is meant by **'Sampling with Replacement'**. Discuss its importance and a scenario where it is used in machine learning.**(10 Marks)**
10. Discuss different **Evaluation Metrics** used for classification models. Provide examples and explain when and why each metric is useful.**(10 Marks)**

Notes for Students:

- For each question, your explanation should cover the basic concept of the model, its advantages, limitations, and a real-world application.
- The image should serve to visually represent the concept or application you discuss.
- Your answers should demonstrate a thorough understanding of each topic.
- Use different examples of each model than described in the questions.