AI-Generated Tasks & Rubrics Document

# Extracted Skills

• Linear Regression

• Decision Tree

• Support Vector Machine

• K-Means Clustering Algorithm

• Neural Networks

• Supervised Learning

• Classification

• Regression

• Image Classification

• Text Categorization

• Unsupervised Learning

• Image Segmentation

• Feature Engineering

# Task Details

## Linear Regression

Objective: Understand how to use linear regression for predictive analysis

Tools: Python, Scikit-learn

Input: Dataset with numerical values for training

Output: Predicted numerical values

Duration: 4

## Decision Tree

Objective: Learn how to build decision tree models for classification and regression tasks

Tools: Python, Scikit-learn

Input: Dataset with features and target variable

Output: Predicted classes or values

Duration: 5

## Support Vector Machine

Objective: Master the concepts and implementation of Support Vector Machine algorithm

Tools: Python, Scikit-learn

Input: Dataset with features and target variable

Output: Predicted classes

Duration: 6

## K-Means Clustering Algorithm

Objective: Learn how to group data points into clusters using the K-Means algorithm

Tools: Python, Scikit-learn

Input: Dataset with features

Output: Cluster labels for each data point

Duration: 7

## Neural Networks

Objective: Understand the fundamentals of neural networks and their application in deep learning

Tools: Python, TensorFlow/Keras

Input: Dataset for training and testing

Output: Predicted classes or values

Duration: 8

## Supervised Learning

Objective: To understand the concept of supervised learning and its applications.

Tools: Python, scikit-learn

Input: Sample dataset with labeled data

Output: Trained model for prediction

Duration: 4

## Classification

Objective: To learn how to classify data into predefined categories.

Tools: Python, scikit-learn

Input: Dataset with features and corresponding labels

Output: Classification model

Duration: 6

## Regression

Objective: To understand how to predict continuous values based on input data.

Tools: Python, scikit-learn

Input: Dataset with continuous target variable and input features

Output: Regression model

Duration: 5

## Image Classification

Objective: To classify images into different categories.

Tools: Python, TensorFlow, Keras

Input: Image dataset with labeled images

Output: Trained image classification model

Duration: 8

## Text Categorization

Objective: To categorize text documents into predefined classes.

Tools: Python, scikit-learn, NLTK

Input: Text dataset with labels

Output: Text categorization model

Duration: 7

## Unsupervised Learning

Objective: Understand and implement unsupervised learning algorithms to discover patterns in data without labeled outcomes.

Tools: Python, scikit-learn

Input: Dataset with unlabeled data

Output: Clustered data points or latent representations

Duration: 10

## Image Segmentation

Objective: Learn how to partition an image into multiple segments to simplify its representation or modify it for easier analysis.

Tools: OpenCV, Python

Input: Image data

Output: Segmented image with distinct regions

Duration: 8

## Feature Engineering

Objective: Create new features from existing data to improve model performance and accuracy.

Tools: Python, pandas

Input: Raw dataset with variables

Output: Enhanced dataset with engineered features

Duration: 12

# Task Statements

## Linear Regression

Task: Implement Linear Regression using Python and sklearn to achieve a Mean Squared Error of less than 5

Difficulty: beginner

## Decision Tree

Task: Build a Decision Tree model in R with at least 80% accuracy on a classification task

Difficulty: intermediate

## Support Vector Machine

Task: Train a Support Vector Machine model in Python with an F1 score of at least 0.85

Difficulty: intermediate

## K-Means Clustering Algorithm

Task: Apply K-Means Clustering in Matlab to group data points with an Adjusted Rand Index of 0.8

Difficulty: intermediate

## Neural Networks

Task: Develop a Neural Network model using TensorFlow to achieve an accuracy of 95% on a classification task

Difficulty: advanced

## Supervised Learning

Task: Implement a supervised learning algorithm in Python to classify handwritten digits with an accuracy of at least 90%

Difficulty: intermediate

## Classification

Task: Create a classification model in R with an Area Under the Receiver Operating Characteristic Curve (AUC-ROC) of 0.9

Difficulty: intermediate

## Regression

Task: Perform a regression analysis in Python using Random Forest Regressor to achieve an R-squared value above 0.7

Difficulty: intermediate

## Image Classification

Task: Implement an Image Classification model in PyTorch with an accuracy of at least 85%

Difficulty: intermediate

## Text Categorization

Task: Build a Text Categorization model in Python with a Precision of 0.85

Difficulty: intermediate

## Unsupervised Learning

Task: Apply Unsupervised Learning in R to segment customer data with a Silhouette Score above 0.6

Difficulty: intermediate

## Image Segmentation

Task: Develop an Image Segmentation algorithm in MATLAB to achieve a Mean Intersection over Union (mIoU) of 0.75

Difficulty: advanced

## Feature Engineering

Task: Perform Feature Engineering in Python using Pandas to increase model performance by 10%

Difficulty: intermediate

# Rubrics

## Instructional Design

Task: Creating learning objectives

|  |  |  |  |
| --- | --- | --- | --- |
| Criterion | Beginner | Intermediate | Advanced |
| Clarity | Objectives are vague and hard to understand | Objectives are clear but may lack specificity | Objectives are clear, specific, and measurable |
| Relevance | Objectives are not aligned with learning outcomes | Objectives are somewhat aligned with learning outcomes | Objectives are completely aligned with learning outcomes |

## Instructional Design

Task: Developing assessments

|  |  |  |  |
| --- | --- | --- | --- |
| Criterion | Beginner | Intermediate | Advanced |
| Validity | Assessments do not measure what they are intended to | Assessments somewhat measure what they are intended to | Assessments accurately measure what they are intended to |
| Variety | Assessments are repetitive and lack diversity | Assessments have some variety but could be improved | Assessments demonstrate a wide range of question types and formats |