Faculty of Computers and Artificial Intelligence Helwan University

Cover sheet

Machine Learning Project

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Project Description Document

Model 1: [Support Vector Machine]

General Information on Classification Dataset:

- **Project Description Document Model 1:** Support Vector Machine for Breast Cancer Diagnosis
- **Dataset Name:** Breast Cancer Dataset
- **Number of Classes:** Classification Task with 2 classes M or B (Predicting Diagnosis)
- **Total Number of Samples:** 570
- **Training Samples:** 456
- **Testing Samples:** 114

Implementation Details:

Feature Extraction Phase:

Number of Features Extracted: All features in the dataset

Feature Names:

- Mean radius
- Mean texture
- Mean perimeter
- Mean area
- Mean smoothness
- Mean compactness
- Mean concavity
- Mean concave points
- Mean symmetry
- Mean fractal dimension
- Radius error
- Texture error
- Perimeter error
- Area error
- Smoothness error
- Compactness error
- Concavity error
- Concave points error
- Symmetry error
- Fractal dimension error
- Worst radius
- Worst texture
- Worst perimeter
- Worst area
- Worst smoothness
- Worst compactness
- Worst concavity
- Worst concave points
- Worst symmetry
- Worst fractal dimension

Dimension of Resulted Features: 29 features

Feature Scaling:

- Standardize input features using StandardScaler

Cross-Validation:

- **Used**: No

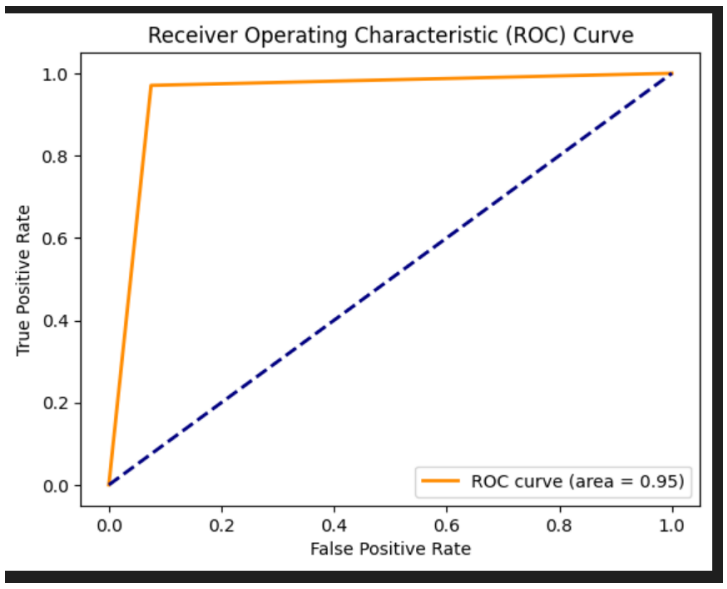
Hyperparameters:

- **Kernel:** Linear
- **Gamma:** Auto
- **Regularization Parameter (C) :** 2

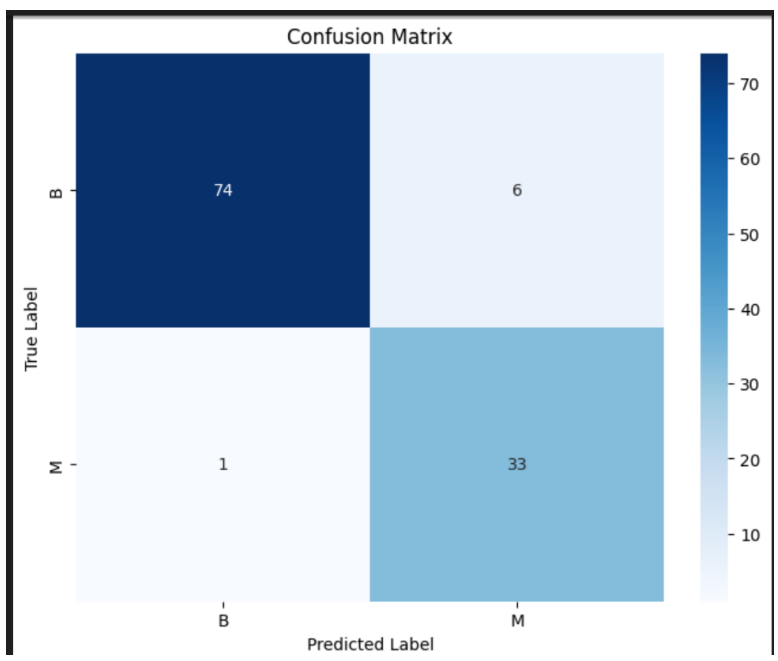
Results Details:

Testing Data:

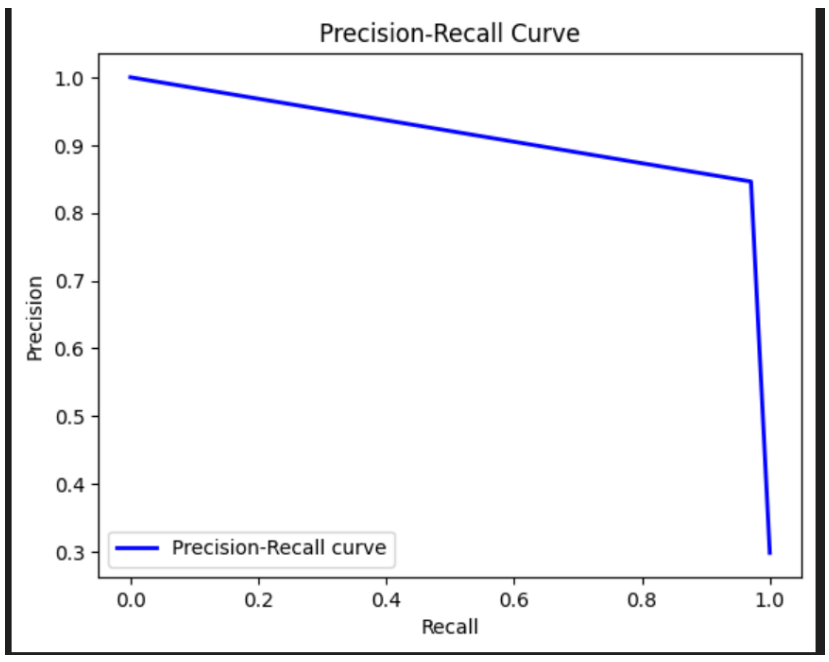
- **ROC Curve:**



- **Confusion Matrix:**



- **Percision Recall Curve:**



- **Accuracy:** [0.93854912280702]
- **ROC AUC Score :** [0.94779411]

Model 2: [Decision Tree]

General Information on Numerical Dataset:

- **Project Description Document Model 2:** Decision Tree Regression for Netflix Stock Price Prediction
- **Dataset Name:** Netflix Stock Price Prediction
- **Number of Classes:** Regression task (Predicting Close Price)
- **Total Number of Samples:** Variable (Depends on the dataset)
- **Training Samples:** Variable (Depends on the dataset)
- **Testing Samples:** Variable (Depends on the dataset

Implementation Details:

Data Preprocessing:

- Handle Missing Values: Drop rows with missing values

Visualization:

- Visualize the Close Price Data

Feature Scaling:

- Used MinMaxScaler to scale the features

Feature Extraction Phase:

Number of Features Extracted: All features in the dataset

Feature Used:

- Open , High , Low , Volume

Target Variable:

- Close Price

Dimension of Resulted Features: 8 features

Cross-Validation:

- **Used**: Yes
- **Number of folds :** 5
- **Training/Validation Ratio/Testing :** 60% / 20% / 20%

Hyperparameter Tuning:

- GridSearchCV to find the best hyperparameters
- Hyperparameters Tuned: max_depth, min_samples_split, min_samples_leaf

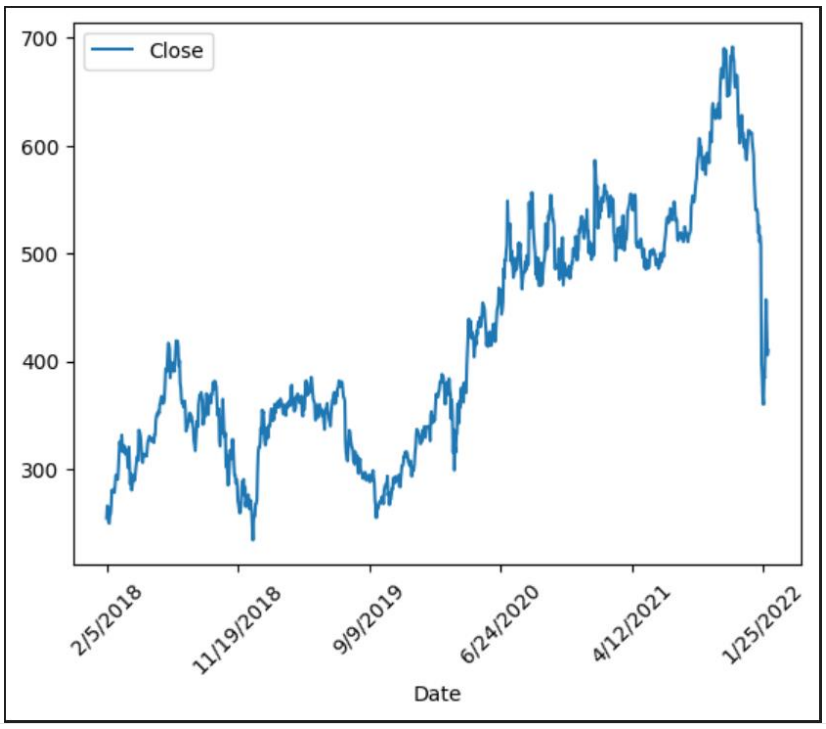
Results Details:

Best Model Parameters:

- max_depth: [Best parameter value]
- min_samples_split: [Best parameter value]
- min_samples_leaf: [Best parameter value]

Evaluation Metrics:

- **Mean Squared Error (MSE) :** [46.2700]
- **Mean Absolute Error (MAE) :** [4.769]
- **Median Absolute Error (MedAE) :** [3.5445]
- **R2 Score :** [0.9960]



Model 3 : [ANN]

General Information on Image Dataset:

- **Project Description Document Model 1:** Artificial Neural Network (ANN) for Netflix Stock Price Prediction
- **Dataset Name:** Netflix Stock Price Dataset
- **Number of Classes:** Regression (Predicting Close Price)
- **Total Number of Samples:** Variable (depends on the dataset)
- **Training Samples:** Variable (depends on the dataset)
- **Testing Samples:** Variable (depends on the dataset)

Implementation Details:

Data Preprocessing:

- Read dataset from 'NFLX.csv'
- Split data into train and test sets using a 80-20 split

Feature Extraction Phase:

Number of Features Extracted: All features in the dataset

Feature Names : Open , High , Low , Volume

- Features Used: Open, High, Low, Volume
- Target Variable: Close Price

Feature Scaling:

- Standardize input features using StandardScaler

Model Architecture:

- Neural Network Architecture:
- Input Layer: 4 neurons (one for each feature)
- Hidden Layers:
- Layer 1: 128 neurons, ReLU activation, 20% dropout
- Layer 2: 64 neurons, ReLU activation, 20% dropout
- Layer 3: 32 neurons, ReLU activation
- Output Layer: 1 neuron (outputting the predicted close price)

Model Compilation:

- Loss Function: Mean Squared Error (MSE)
- Optimizer: Adam with learning rate of 0.001

Model Training:

- Train the model for 100 epochs with a batch size of 32
- Validation split of 20% used for monitoring training progress

Hyperparameters:

- Learning Rate: 0.001
- Dropout Rate: 20%

Results Details:

Training and Validation Loss:

- Plot of Training and Validation Loss over epochs

Predictions:

- Predictions made on the test set

Evaluation Metrics:

- Mean Squared Error (MSE)
- Mean Absolute Error (MAE)
- Median Absolute Error (MedAE)
- R2 Score

Results:

Mean Squared Error: [47.05521633022602]
Mean Absolute Error: [5.029698599396657]
Median Absolute Error: [4.12031537597656]
R2 score: [0.9958769246324329]

User Interaction:

- Function to predict stock price based on user input for open price, high price, low price, and volume
- User prompted to input open price, high price, low price, and volume
- Predicted close price displayed based on user input