Report: Analysis and Insights on Implemented Codes

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1. Chatbot Development

Overview

Chatbots are AI-driven tools designed to interact with users. They streamline user communication by addressing queries and automating repetitive tasks.

Implementation

- **Normal Chatbot:** A basic chatbot programmed to handle generic conversations.
- **Healthcare Chatbot:** Focused on answering health-related queries, scheduling appointments, and providing general wellness advice.
- **College Virtual Assistant:** A tailored assistant for students and faculty to check schedules, access academic resources, and interact with administrative processes.

Insights

- **Normal Chatbot:** Demonstrates natural language understanding for broad queries but lacks domain-specific depth.
- **Healthcare Chatbot:** Shows the integration of medical databases and patient records for tailored advice.

- **College Virtual Assistant:** Highlighted features include schedule management, event reminders, and quick responses to FAQs, improving campus life.

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2. Logistic Regression

Overview

Logistic Regression is a supervised learning algorithm used for binary classification tasks. Key metrics include the ROC Curve and Classification Report.

Implementation

- **ROC Curve:** Visual representation of the trade-off between sensitivity and specificity.
- **Classification Report:** Summarizes precision, recall, F1-score, and accuracy.

Insights

- The **ROC Curve** illustrates how well the model distinguishes between classes, with an AUC close to 1 indicating strong performance.
- The **Classification Report** highlights areas needing improvement (e.g., class imbalance or feature refinement).

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3. Mean Squared Predictor

Housing Data

Overview

Predicting housing prices using regression models based on features like size, location, and amenities.

Metrics

- **Mean Squared Error (MSE):** Measures average prediction error.
- **Root Mean Squared Error (RMSE):** Provides interpretability in the units of the target variable.

Insights

- Lower MSE and RMSE values indicate a reliable model. Adjusting features and hyperparameters can further enhance accuracy.

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4. Stock Predictor

Overview

Forecasting stock prices based on historical data.

Metrics

- **Loss:** Represents the difference between predicted and actual values.
- **R-Squared Value:** Explains the proportion of variance captured by the model.
- **MSE and RMSE:** Key indicators of prediction performance.

Insights

- An **R-Squared Value** close to 1 suggests a strong model fit.
- High accuracy in stock prediction is often challenging due to market volatility.

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5. K-Means Clustering

Overview

K-Means clustering is an unsupervised learning method to group data points into clusters based on similarity.

Implementation

- Features: **Age** and **GPA** of students.
- Goal: Segregate students into distinct groups (e.g., high-performing young students, mature learners).

Insights

- **Cluster Analysis:** Provides insights into student demographics and performance trends.
- **Applications:** Tailoring academic support for each group, identifying high-risk students.