

Project Report: Comprehensive Forecasting System with User Interface for Multiple Sectors

1. Introduction:

The Comprehensive Forecasting System is a sophisticated tool designed to provide accurate forecasts for various sectors, including finance, energy, and environment. The system integrates multiple time series forecasting models, such as ARIMA, ANN, SARIMA, Exponential Smoothing, Prophet, SVR, LSTM, and Hybrid ARIMA-ANN, to leverage the strengths of each model and enhance forecast accuracy. Additionally, a user-friendly front-end interface allows users to interact with the system easily, visualizing data and forecasts in real-time.

2. Data Sources and Preprocessing:

For this project, we primarily utilized energy consumption data. The preprocessing steps included cleaning the data by identifying and imputing or removing missing values, normalizing or standardizing the data to ensure uniform scaling, and stationarizing the data through differencing and logarithmic transformations to achieve stationarity.

3. Model Development:

ARIMA Configuration and Tuning: ARIMA models were configured and tuned to capture non-stationary and seasonal patterns in the data.

ANN Design and Training: Artificial Neural Networks were designed with varying architectures to model complex relationships in the data.

SARIMA (Seasonal ARIMA): SARIMA models extended ARIMA to handle seasonal time series data.

Exponential Smoothing (ETS): Exponential Smoothing models were employed to handle trends and seasonalities in the data.

Prophet: The Prophet model was used for time series with strong seasonal effects and historical holidays.

Support Vector Regression (SVR): SVR models were applied to capture nonlinear relationships in the data.

Long Short-Term Memory (LSTM): LSTM networks were utilized for sequence prediction problems, effectively learning order dependence in the data.

Hybrid Models Integration: Hybrid ARIMA-ANN models combined the strengths of ARIMA and ANN to improve forecast accuracy.

4. Frontend Development:

The frontend interface was developed using ReactJS for dynamic and responsive user interaction. Users can easily select datasets, initiate model comparisons, and view forecasts through an intuitive UI.

5. Testing and Validation:

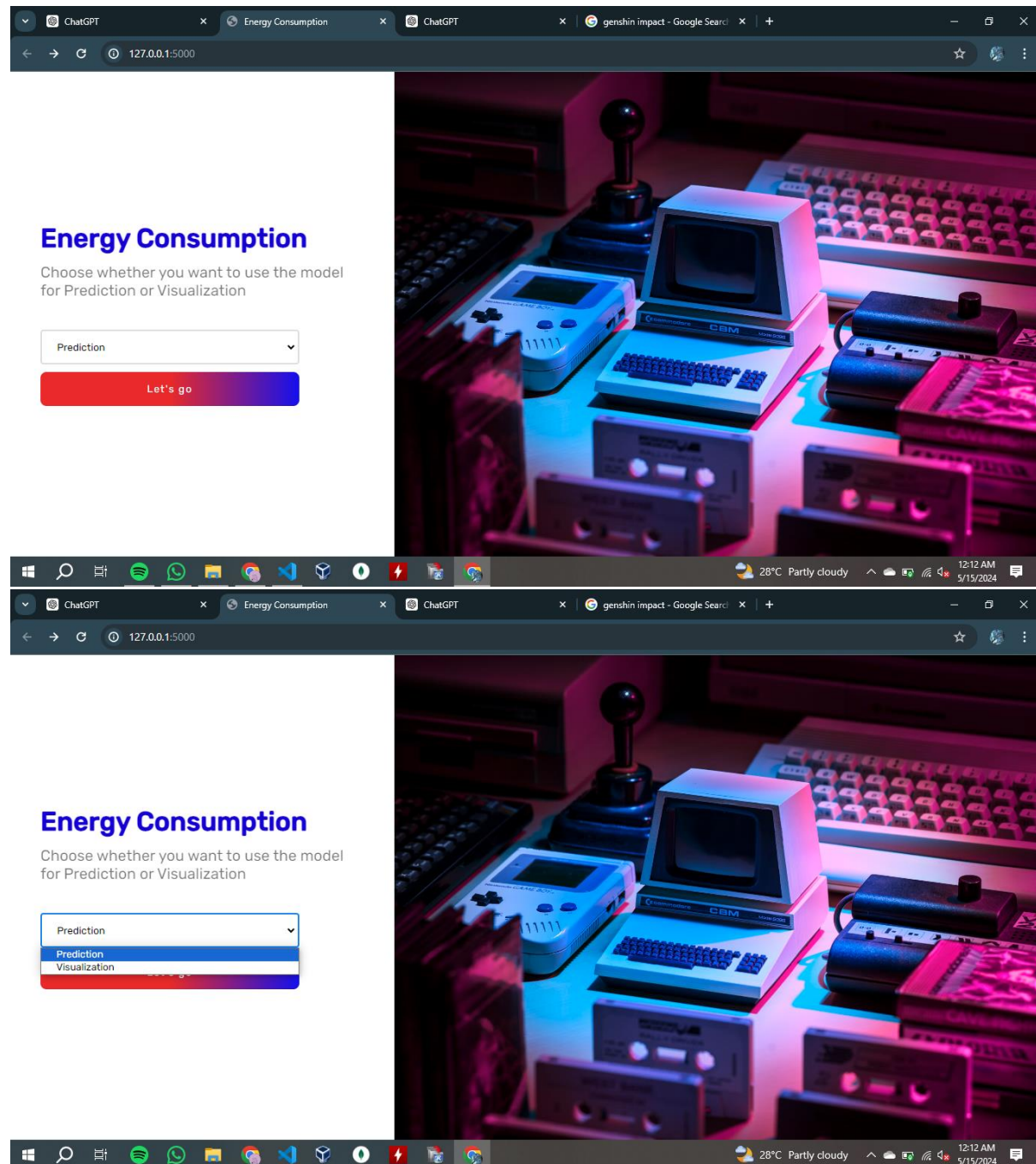
Model Testing: Historical data was used to validate the models' predictions, ensuring reliability and accuracy.

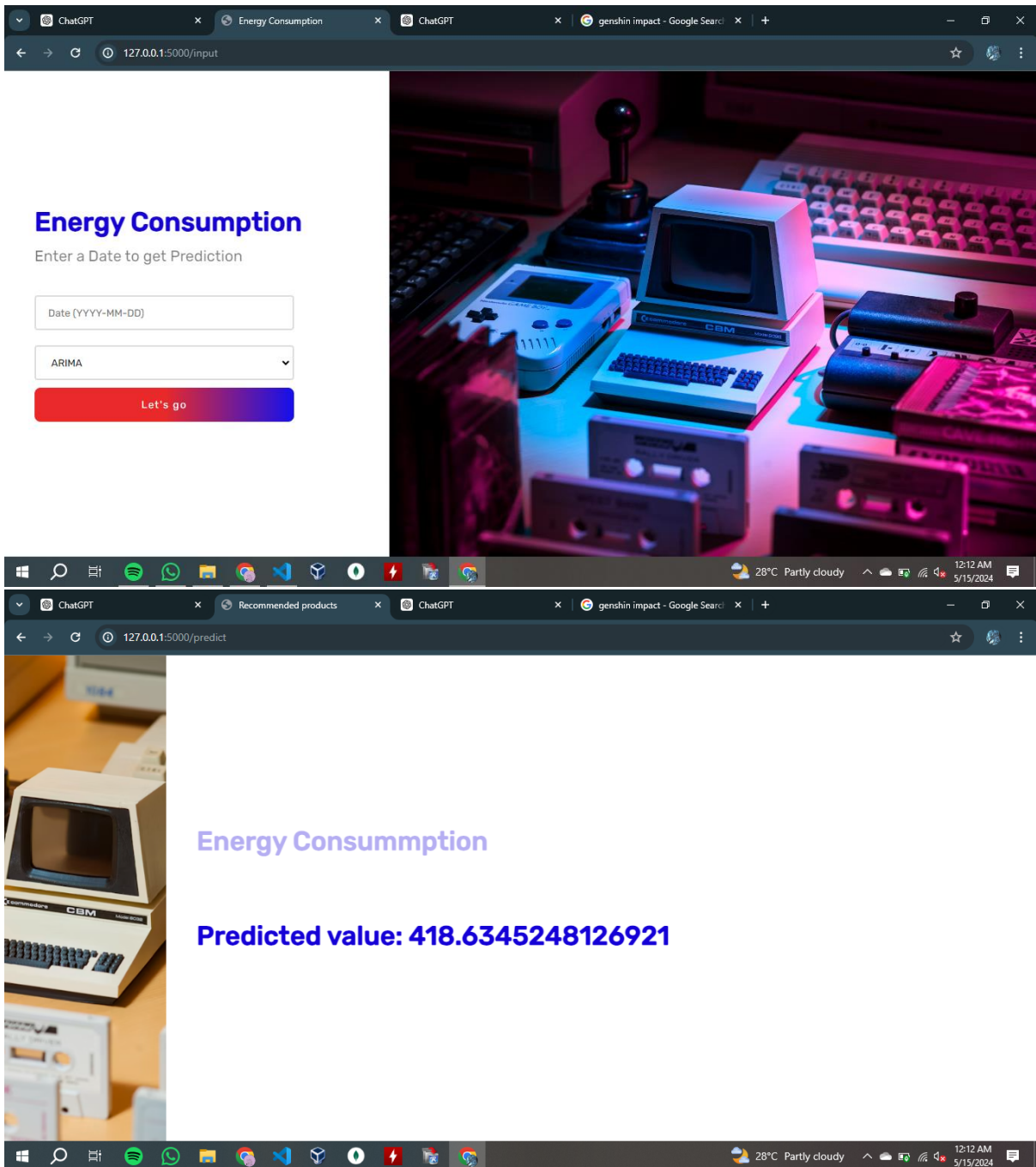
System Testing: Unit tests were conducted for individual components, and integration tests were performed for overall system functionality to confirm proper operation without errors.

6. Deployment:

The application was deployed to a scalable platform, making the forecasting system accessible to users for real-time forecasting.

7. Front-end :





Energy Consumption

Enter a Date to get Prediction

Date (YYYY-MM-DD)

ARIMA

Let's go

Energy Consumption

Predicted value: 418.6345248126921

The image shows two screenshots of a web application interface for "Energy Consumption". The browser tabs include "ChatGPT", "Energy Consumption", and "genshin impact - Google Search". The address bar shows "127.0.0.1:5000/input".

Top Screenshot:

- Energy Consumption**
- Enter a Date to get Prediction
- Date input: 2024-11-14
- Model selection dropdown: ARIMA (selected), ANN, SARIMA, ETS, Prophet, SVR, LSTM, Hybrid

Bottom Screenshot:

- Energy Consumption**
- Choose model for Visualization
- Model selection dropdown: ARIMA (selected)
- Red button: Let's go

The background of the application is a vibrant, neon-lit image of retro gaming equipment, including a CRT monitor, a joystick, and various controllers, creating a nostalgic atmosphere.


ChatGPT Energy Consumption ChatGPT genshin impact - Google Search

127.0.0.1:5000/input

Energy Consumption

Choose model for Visualization

- ARIMA
- ARIMA
- ANN
- SARIMA
- ETS
- Prophet
- SVR
- LSTM
- Hybrid



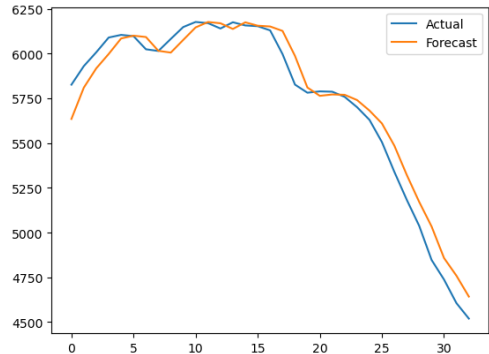
28°C Partly cloudy 12:14 AM 5/15/2024

ChatGPT Visualization ChatGPT genshin impact - Google Search

127.0.0.1:5000/visual

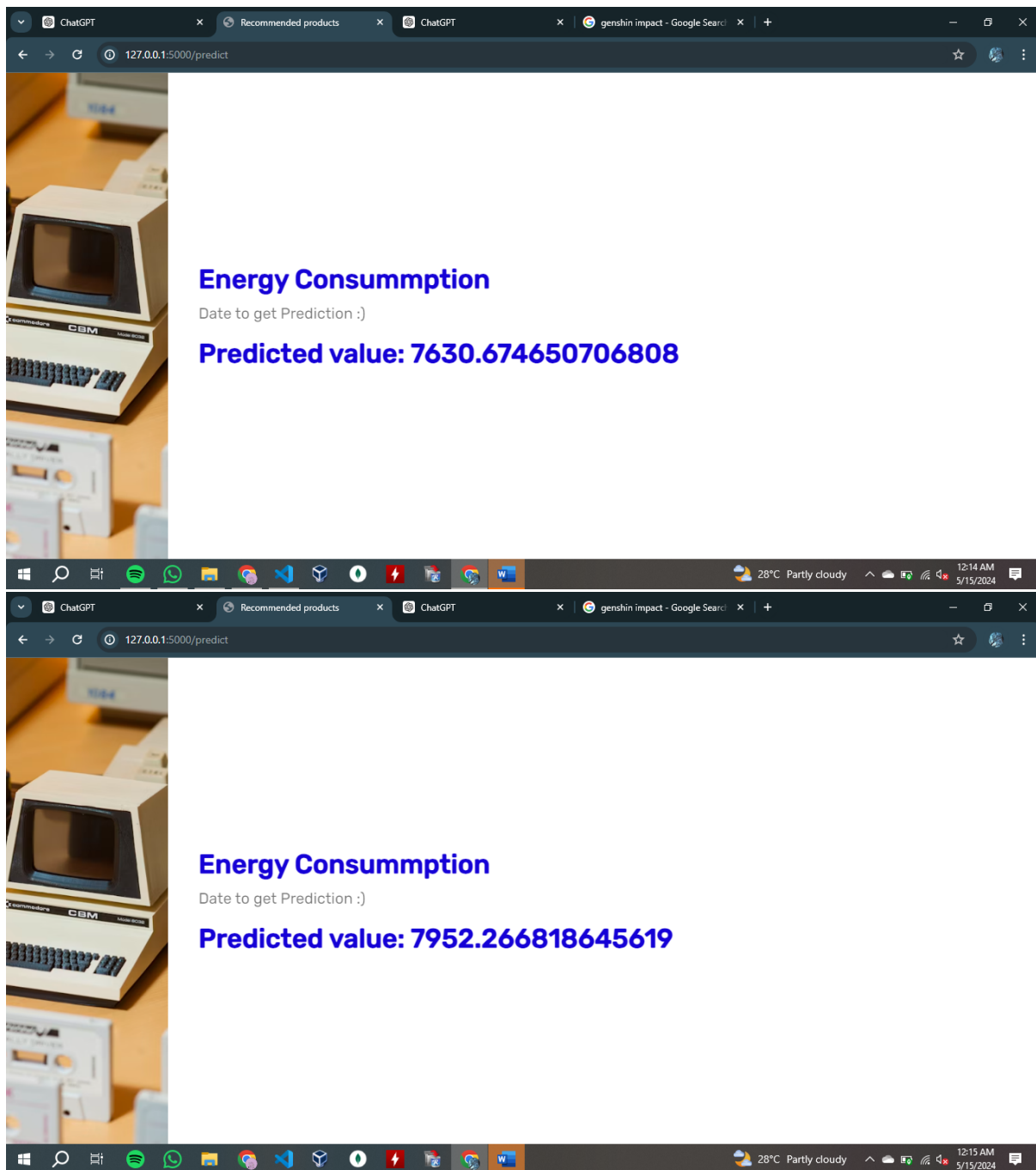
Model Visualization

Visualization for lstm



Time Step	Actual	Forecast
0	5800	5600
5	6100	6100
10	6150	6150
15	6100	6100
20	5800	5800
25	5200	5200
30	4600	4700

28°C Partly cloudy 12:14 AM 5/15/2024



8. Conclusion:

The Comprehensive Forecasting System provides an advanced solution for forecasting across multiple sectors. By integrating various time series models and offering a user-friendly interface, the system enables accurate and efficient

forecasting for diverse datasets. With thorough testing and validation, the system ensures reliability and robust performance in real-world applications.

9. Accuracy:

Models	Measurement	Value
1. ARIMA	Accuracy	92.0388952148133
2. ANN	Accuracy	91.0625527598262
3. SARIMA	Accuracy	86.8576800708499
4. ETS	Accuracy	87.0614293875295
5. SVR	Accuracy	94.3321788961516
6. LSTM	Accuracy	93.0646268381966
7. Hybrid	Accuracy	95.5701158956781

10. Acknowledgments:

We would like to acknowledge the contributions of all team members to the successful development and implementation of the Comprehensive Forecasting

System. Additionally, we extend our gratitude to the project supervisors and stakeholders for their support and guidance throughout the project duration.

Work

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