# Time Series Analysis Dashboard in R Shiny

## Overview

An interactive and educational Shiny web application for time series analysis. It allows graphical exploration, stationarity checks, decomposition, model fitting (ARIMA, ARCH, GARCH), diagnostics, and forecasting.

## Features

- Upload and analyze CSV time series data.
- EDA: Handle missing/duplicate values.
- ACF/PACF for original & stationary data.
- Auto stationarity via transformations.
- ADF Test for stationarity.
- Model suggestions: AR, MA, ARIMA, ARCH, GARCH.
- Residual diagnostics.
- Forecasting with user-defined horizon.
- Downloadable results.

## Getting Started

Install dependencies:

```
install.packages(c("shiny", "ggplot2", "forecast", "tseries", "rugarch", "zoo", "FinTS", "TTR", "dplyr"))
```

Run app:

shiny::runApp("grp1_team_task")

Usage Instructions

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1. Upload CSV file.

2. Select time series column.

3. Explore via EDA tab.

4. View ACF/PACF (original & stationary).

5. App applies transformations as needed.

6. Choose model or use auto suggestion.

7. Forecast with selected horizon.

8. Download outputs.

Interpretation Guide

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EDA:

- Missing -> Imputed (mean)

- Duplicates -> Removed

- Trend/Seasonality shown

Stationarity:

- ADF test: p < 0.05 -> stationary

- Differencing/log transform applied if non-stationary

ACF/PACF:

- ACF/PACF cutoff patterns help identify model orders

Model Selection:

- auto.arima() suggests best ARIMA(p,d,q)

- ARCH/GARCH used if volatility clustering present

Diagnostics:

- White noise residuals expected

- Ljung-Box test: p > 0.05 -> no autocorrelation

Forecasting:

- User sets forecast horizon

- Outputs include confidence intervals

Dependencies

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- shiny, ggplot2, forecast, tseries, rugarch, zoo, FinTS, TTR, dplyr

Credits

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Developed by a 5-member academic team for an advanced time series project.