A Major Project Synopsis on

**GOLD PRICE PREDITION MODAL**

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by

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**I. Introduction** :- Gold has been a trusted investment and an economic uncertainty hedge for ages Its price is determined by various macroeconomic forces, such as currency exchange rates, inflation, interest rates, and geopolitical situations. It is a difficult job to predict the prices of gold accurately because of their volatility. With the advances in machine learning (ML), data-driven techniques have proved extremely promising for the prediction of financial markets. This project will create a machine learning model that can forecast future gold prices using past data and other economic indicators, offering actionable information for investors and analysts.

**II. Motivation** :- Price un-predictability of gold has profound implications on global financial markets & Investors must provide accurate forecasts on the basis of the predictions, but traditional finance models can not capture the non linear dynamics between many underlying variables. Machine learning offers robust methods to identify underlying trends and patterns from largest data. This project stems from the potential of using machine learning techniques to improve the accuracy of prediction and aid more concrete decision-making in the gold investment market.

**III. Problem Statement** :- Predicting gold prices is a complicated task because of the interplay of various factors such as currency exchange rates, crude oil, inflation, share market and global political stability. Conventional approaches, even the simple statistical methods for time series forecasting, are generally inadequate to address the intricacies of the problem. Hence, in this project, it is proposed to formulate a strong machine learning-based model to predict gold prices with accuracy based on past data and other market indicators.

**IV. Methodology/Work Planning**

**1. Data Collection:**

• Historical gold price data set (Kaggle.com) (https://www.kaggle.com/altruistdelhit.)

• Data on external drivers: currency exchange rates, oil prices, stock market indexes, and interest rates.

**2.Data Preprocessing:**

• Cleaning the data: Remove missing values and fix inconsistencies.

• Transform data: Convert data to suitable formats for analysis.

•Normalize and standardize features to enable uniform scaling.

•Time series formatting to align external factors with movements of gold price.

3.Exploratory Data Analysis (EDA):

•Find seasonality and trends in historical gold prices

•Explore correlations of gold prices and external factors.

•Graph data trends in line graphs, heatmaps, and box plots.

**4.Feature Engineering:**

• Generate new features such as moving averages, volatility indicators and lagged price values.

**5.Model Building:**

• Train several machine learning models:

• Linear Regression

• Decision Tree and Random Forest

• XGBoost

• LSTM (Long Short-Term Memory) neural networks for making predictions for time series forecasting.

• Perform cross-validation to avoid overfitting.

**6. Model Verification**

• Validate the models using performance measures like Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and R² score.

• Compare and select the best among different models based on performance.

**7. Hyperparameter Tuning:**

• Improve the selected model by utilizing grid search or random search, among other strategies, to optimize its accuracy.

**8. Visualization:**

• Plot forecasted vs actual gold prices using time series plots.

• Create interactive dashboards for visualizing trends and forecasts.

**V. Requirements for Proposed Work Hardware**:

• A computer with a minimum of 8GB RAM, multi-core processor and SSD storage for optimal data processing.

**Software and Libraries:**

• Languages: Python 3.x

• Libraries: Pandas and NumPy for data manipulation.

• Scikit-learn for machine learning model construction.

• Matplotlib and Seaborn for plotting.

• XGBoost for gradient boosting.

• TensorFlow/Keras for deep learning (LSTM).

**Tools:**

• Jupyter Notebook or Google Colab for coding and experimenting.

**Data Sources:**

• Historical gold price data from Kaggle.

• Currency exchange rates, crude oil prices, and stock market indices from financial data feeds.

**VI. Bibliography/References**

1. World Gold Council - "Historical Gold Price Data."

2. Kaggle - "Gold Price Data" dataset.

3. "Forecasting Financial Markets," John Wiley & Sons, 2019.

4. "Time Series Analysis and Its Applications," Springer.

5. Scikit-learn Documentation (https://scikit-learn.org/).

6. TensorFlow Documentation (https://www.tensorflow.org/).

**Conclusion :**

This project will give a holistic framework for the prediction of gold prices based on sophisticated machine learning methods. By harnessing historical data and external economic variables, the model will provide more accurate insights compared to conventional forecasting models. The information derived from the forecasts will help investors, traders, and financial institutions make educated choices in the volatile gold market.