



# **PUSL3190 Computing Individual Project**

## **Project Proposal**

Future Gold: Smart Price Predictions for  
Pawning Success

Supervisor: Ms. Hirushi Dilpriya

Name: Panikka Kulathunga  
Plymouth Index Number: 10898799  
Degree Program: BSc (Hons) Computer Science

## **PUSL3190 Computer Individual Project**

### **Project Proposal: Future Gold: Smart Price Predictions for Pawning Success**

#### **Chapter 01: Problem Statement**

Gold prices are known to fluctuate, affected by a variety of factors such as the economy and global events. This is a challenge for pawn businesses, who rely on the value of gold to supply loans. If a pawn shop makes a loan based on a high gold price and then the value lowers, they may lose money because the gold (often in the form of jewellery) becomes less desirable. This means they may be unable to retrieve the loan amount if the borrower does not repay it.

Pawn shops must also strike a balance between fair pricing and staying in business. If they set loan amounts that are excessively high, customers may perceive the rates to be unjust, prompting them to seek alternative financing. However, if the loan amounts are too low, they risk failing to capitalise on the gold's prospective worth, jeopardising their financial stability. Pawn shops compete with banks and other lenders, so they must offer competitive rates while managing the risks associated with shifting gold values.

Many pawn shops continue to employ traditional ways to decide how much money to lend based on the current price of gold. This method is reactive and does not evaluate how gold prices may change in the future. For example, if gold prices rise sharply owing to economic instability, a pawn shop that has previously made loans based only on historical pricing may pass up the opportunity to lend more. This can reduce company revenues and increase their financial risks, particularly if they have to sell products for less than their true worth.

Furthermore, pawn shops' manual processes for determining gold value might result in human errors and delays. When customers need cash right away, pawn brokers must frequently make rapid decisions concerning loan amounts. Without the assistance of data and technology, these rapid decisions can be incorrect. Furthermore, waiting too long to examine gold and finalise loans can result in missed opportunities, especially when values fluctuate swiftly. This inefficiency can frustrate clients and undermine the pawn shop's ability to compete in the market.

In conclusion, pawn shops have various obstacles when estimating loan amounts based on gold value. The volatility of gold prices, outmoded methods, and reliance on manual processes all pose dangers to their operations. Pawn shops can overcome these challenges by utilising technology and advanced analytics to predict gold price swings and automate the appraisal process. By doing so, they may make better lending judgements, operate more efficiently, and give better service to their clients while safeguarding their financial interests in an explosive market.

## **Chapter 02: Project Description**

The suggested gold market price prediction system is a machine learning-based solution developed primarily for use in pawn shops. The system's purpose is to forecast future gold prices over many time periods (three, six, and twelve months) using historical data and a combination of machine learning algorithms. By incorporating price projections into their pricing strategy, pawn shops can provide consumers with more equitable loan values while protecting their business from potential losses due to swings in gold prices.

The system will be developed in Python, using sophisticated libraries like Pandas for data manipulation, Scikit-learn for machine learning models, and Matplotlib for data visualisation. It will use past gold price data, as well as external economic variables like inflation, interest rates, and currency exchange rates, to forecast future price changes. Several machine learning techniques, such as Long Short-Term Memory (LSTM) networks, Random Forest, and ARIMA (Autoregressive Integrated Moving Average), will be tested and analysed to see which model is the most accurate in predicting gold values over time. (Khulood Albeladi, Khulood Albeladi, Ahmed Mueen, 2023)

Once trained, the algorithm will estimate prices for three, six, and twelve months. These projections will be displayed via a user-friendly interface, allowing pawning centre personnel to readily input current market data and view suggested gold price recommendations. The technology will update predictions in real time as new data becomes available, ensuring that the suggestions reflect the most recent market developments. The final product will also contain a function that visualises historical trends and predictions, giving consumers a clear picture of how gold prices have fluctuated over time.

This research will be a great resource for pawn shops as they navigate the difficulties of gold pricing in a fluctuating market. The successful adoption of this system has the potential to revolutionise the way pawn shops operate by giving cutting-edge prediction capabilities to help them stay competitive in the sector.

### **Project Objectives and Explanations:**

#### **1. Predict future gold prices over short- and long-term periods**

The prediction system will be developed to forecast gold prices across several time periods, including short-term (three months), medium-term (six months), and long-term (twelve months). This enables pawn shops to make informed decisions based on the most relevant timeframe for their business. A short-term prediction, for example, may assist with daily or weekly operations, but longer-term predictions can benefit in strategic planning. The technology ensures that the pawning centre can adjust to both current and future market conditions by offering forecasts over several time periods.

#### **2. Recommend the best price for pawning centres based on these predictions**

Once the technology forecasts future gold prices, it will recommend the best loan values and gold prices for pawn shops to employ. These recommendations will -

consider not only expected pricing trends, but also the pawning centre's business strategy, client expectations, and risk tolerance. The goal is to ensure that the centre can provide competitive rates that attract customers while protecting itself from financial losses caused by unforeseen price volatility.

### **3. To minimise business losses caused by rapid market price swings**

One of the system's primary goals is to mitigate the financial risks associated with unexpected reductions or surges in gold prices. Price shifts in volatile markets can occur quickly, exposing pawnshops to significant losses if they are unable to respond swiftly. By giving precise predictions and pricing recommendations, the system will enable pawn shops to anticipate these changes and set loan values that limit the likelihood of experiencing losses when the market unexpectedly shifts.

### **4. To increase customer satisfaction by providing fair and transparent pricing**

Customers frequently use pawning services to get loans against their gold valuables, expecting to receive fair value for their collateral. Using a prediction system that provides clear and data-driven pricing recommendations, pawn shops can increase client trust and happiness. The technology will give a rational basis for pricing, ensuring that customers understand how their loan amounts are calculated. Fair and consistent pricing can assist create long-term client connections since customers will believe they are getting fair deals based on current market conditions.

## **Project keywords:**

Gold Price Prediction, Machine Learning, Pawning Centres, Price Forecasting, Financial Risk Management

## **Chapter 03: Research Gap**

Numerous machine learning algorithms, such as ARIMA, Random Forest, and LSTM (Long Short-Term Memory) models, have been used in the considerable study on gold price prediction. Although these studies have shown how well machine learning can predict gold prices, they were mostly created for general financial applications like investing and market forecasting. (Amirhossein Amini, Robab Kalantari, 2024) Most of these methods concentrate on daily trading tactics or worldwide financial trends, but they do not consider the unique requirements of companies like pawning centres, which function in a different environment.

For instance, it has been demonstrated that the CNN-Bi-LSTM model performs better than other models in forecasting gold prices because of its capacity to catch extreme values and swiftly adjust to new data. (Amirhossein Amini, Robab Kalantari, 2024) However, rather than offering advice on how to determine loan values at pawning centres, these techniques are meant to maximise trading strategies. They fail to consider the operational risks that pawning companies encounter, like the requirement for loan value projections that consider both the state of the market and consumer expectations.

Furthermore, most current solutions are not designed to consider the special transactional aspects of pawning, where determining fair and precise loan amounts is more important than merely forecasting price trends. Additionally, these models lack capabilities that deal with the aspect of the organisation that deals with client engagement, where customer happiness and loan pricing transparency are crucial elements. The use of machine learning for customised gold price prediction algorithms that directly assist pawning centres' risk management and pricing decisions is thus severely lacking.

By creating a customised prediction system for pawning centres, this project seeks to close that gap. In addition to predicting gold prices, it will offer practical suggestions based on the centre's particular business strategy and risk tolerance, assisting in bridging the gap between current financial prediction models and the real-world requirements of the pawning sector.

## Chapter 04: Requirements Analysis

- ✓ Programming Languages: Python provides data analysis and machine learning libraries such as **Pandas** (for data handling), **TensorFlow** (for develop deep learning models), and **Scikit-learn** (for implementing traditional machine learning models like as Random Forest, ARIMA).
- ✓ Data Sources: Collect historical gold price data from reputable financial databases or APIs like **Yahoo Finance**, **Kaggle**. Furthermore, economic factors like interest rates, inflation rates, and currency exchange rates will be incorporated to increase prediction accuracy.
- ✓ Machine Learning Models: The accuracy and dependability of the **ARIMA** (Auto Regressive Integrated Moving Average), **LSTM** (Long Short-Term Memory), and **Random Forest** models will be examined.
- ✓ Interface Development: Python web frameworks like **Flask**, **Django** will be used to create a basic web-based interface. Users (such pawning centre employee) will be able to read forecasts for three, six, and twelve months as well as enter current market data. Historical and predicted price patterns will be shown using data visualisation programmes like **Matplotlib**.

## Chapter 05: Finance

This project does not require a substantial financial commitment because open-source software will be used extensively.

## Chapter 06: External Organizations

As part of this study, **Navarathna Pawn Centre** in Udawalawa, Sri Lanka has been extremely helpful in gathering information about the day-to-day activities of a pawning centre. Their assistance has been critical in understanding how the company manages gold loans, evaluates collateral, and determines loan prices. By monitoring their operations and obtaining comments from employees, I obtained a thorough grasp of the problems and dangers associated with pricing gold in volatile markets.

# Chapter 07: Time Frame / Timeline

## GANTT Chart

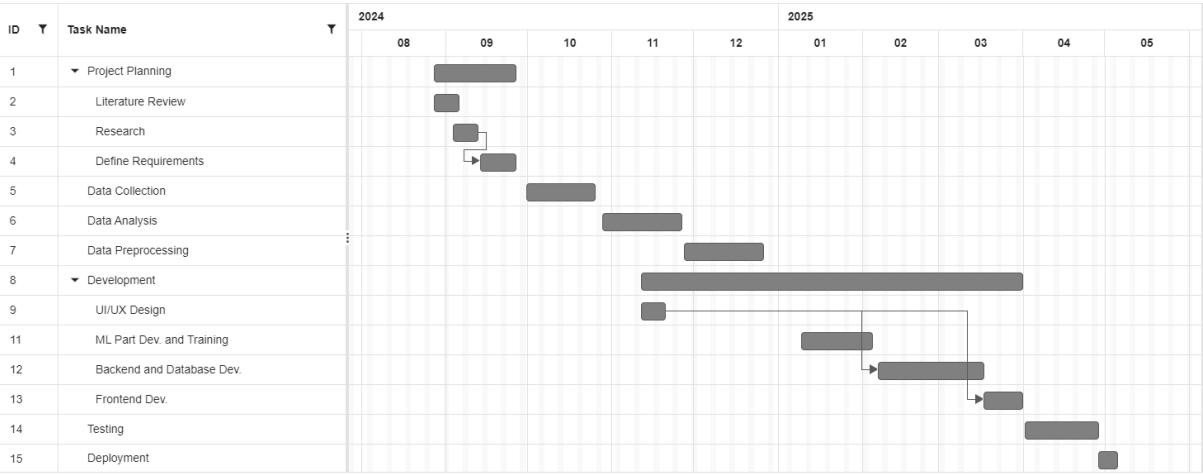


Figure 1

## References

- Amirhossein Amini, Robab Kalantari. (2024, March 7). *Gold price prediction by a CNN-Bi-LSTM model along with automatic parameter tuning*. Retrieved from plosone:  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0298426>
- Khulood Albeladi, Khulood Albeladi, Ahmed Mueen. (2023, January). *Time Series Forecasting using LSTM and ARIMA*. Retrieved from researchgate:  
[https://www.researchgate.net/publication/367986282\\_Time\\_Series\\_Forecasting\\_using\\_LSTM\\_and\\_ARIMA](https://www.researchgate.net/publication/367986282_Time_Series_Forecasting_using_LSTM_and_ARIMA)