DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Homework Assignment No. 06:

HW No. 06: Hidden Markov Models (HMMS)

submitted to

Professor Joseph Picone
ECE 8527: Introduction to Pattern Recognition and Machine Learning
Temple University
College of Engineering
1947 North 12th Street
Philadelphia, Pennsylvania 19122

April 4, 2024

prepared by:

Leo Berman
Email: leo.berman@temple.edu

A. HISTORICAL GOLD PRICES

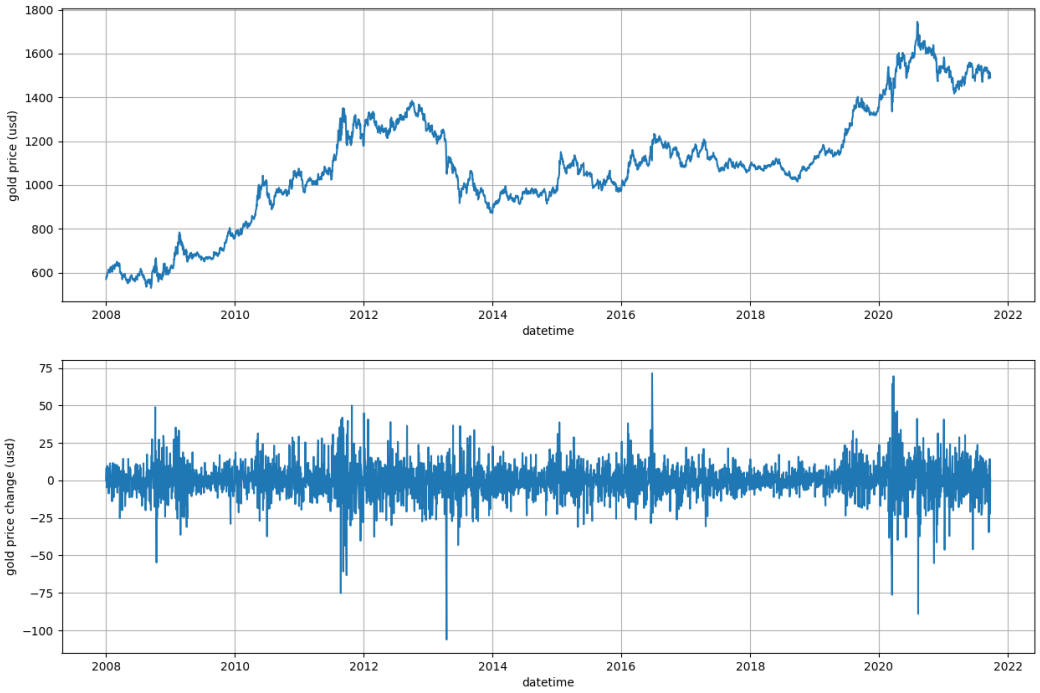

Figure 1: Historical Gold Prices

B. START PROBABILITIES

Start probabilities:

$$\begin{bmatrix} 1.00000000e+00 & 3.27494764e-45 & 9.10550524e-26 \end{bmatrix}$$

C. TRANSITION MATRIX

$$\begin{bmatrix} 0.90377517 & 0.00115619 & 0.09506864 \\ 0.00274375 & 0.6610414 & 0.33621485 \\ 0.1589667 & 0.10934194 & 0.73169136 \end{bmatrix}$$

D. GAUSSIAN DISTRIBUTION MEANS

$$\begin{bmatrix} 0.30522947 \\ 0.09988041 \\ 0.22802271 \end{bmatrix}$$

E. GAUSSIAN DISTRIBUTION COVARIANCES

$$\begin{bmatrix} 35.82198269 \\ 533.61402872 \\ 131.17083162 \end{bmatrix}$$

F. MARKET VOLATILITY

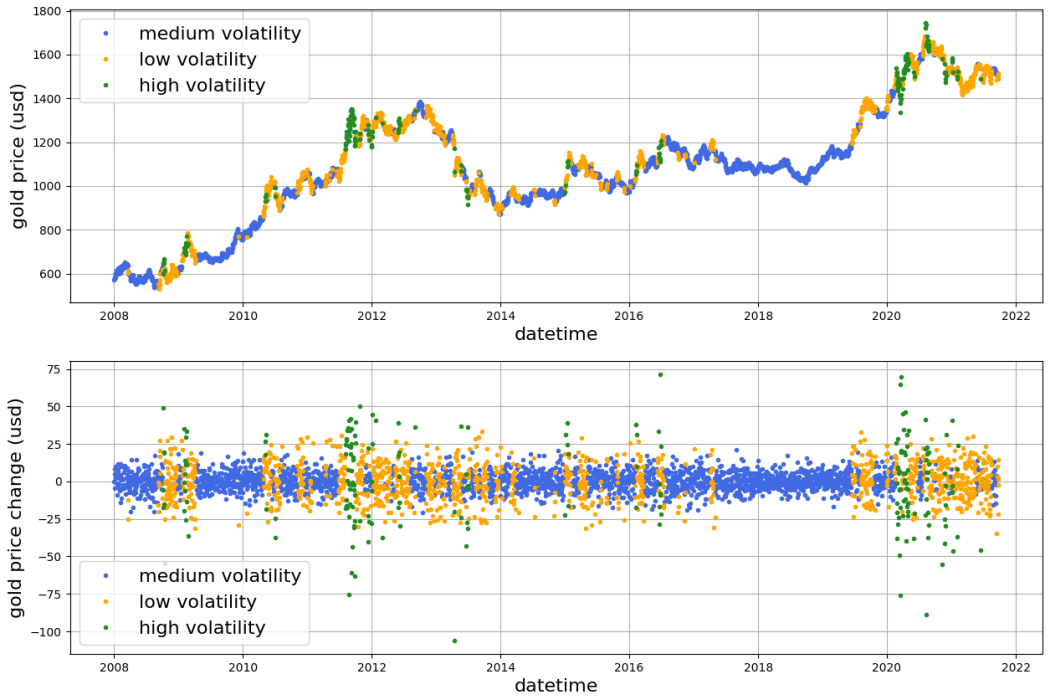

Figure 2: Market Volatility

G. SUMMARY

Overall, my results were similar to the expected. My numbers were slightly off which may have something to do with the random seeding of the model, or the version of the libraries I used. While I think the library I used is from aroudn the same time period, it gave the results back in a slightly different order as seen in the numeric sections and the order of the key/plotting in the Market Volatility graph seen in Figure 2.