
FORECASTING CRUDE OIL PRICE USING ARIMA AND FACEBOOK PROPHET WITH MACHINE LEARNING

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Abstract. Oil price forecasting has received a great deal of attention from practitioners and researchers alike, but it remains a difficult topic because of its dependency on a variety of factors, including the economic cycle, international relations, geopolitics, and so on. Forecasting the price of oil is a difficult but gratifying task. Motivated by this issue, we present a robust model for accurate crude oil price forecasting using ARIMA and PROPHET models based on machine learning technique to produce a reliable weekly and monthly crude oil price predictions. We apply the Savitzky–Golay smoothing filter to get a better denoising performance for our forecast models. For model evaluation, we apply cross validation with sliding windows on both models and compares the performances using RMSE and MAPE. The results shows that the ARIMA- based machine learning approach performs better as compared to the PROPHET model for both one-week and one-month forecast ahead intervals.

Keywords: crude oil price, forecasting, Arima, Fbprophet.

Introduction

The 2020 outbreak of the coronavirus has shaken up the energy markets and created widespread upheaval. The energy sector, perhaps more than any other industry, was severely impacted by the pandemic's outbreak. In recent history, the COVID-19 crisis has brought more disturbance than anything else, leaving wounds that will last for years. The demand for oil has plummeted globally following the closure of various national borders and the introduction of travel-related restrictions aimed at stopping the spread of the virus. Further, the need for oil and other forms of energy has been reduced significantly because of social distancing mandates and disrupted shipments. In an unprecedented record of WTI pricing constituting the benchmarking for American crude oil, the price collapsed to minus USD 37.63 per barrel on April 20, 2020. This has never been witnessed in history. This implies that producers pay purchasers to take crude from them due to concerns that storage capacity may be exhausted. As the global lockdown prevented transportation, demand for crude oil plummeted, and producers were forced to rent tankers to store excess oil, causing prices to fall. Although the United States has the biggest number of COVID-19 cases as of May 2021, the virus's impact on the rest of the world cannot be ignored, particularly in mono-economic countries whose economies are solely dependent on the performance of the oil industry.

The crude oil market, the baseline of the petroleum industry, has a far bigger volume of trade than the others. Due to its strong interaction with companies' future strategy, risk management, and household expenses, it has attracted considerable attention in the previous two decades. A large scholarly literature is present on the crude oil market in view of their importance and strong relationship with other commodities, such as gold, stocks, and exchange rates. In the past, huge swings in oil prices have resulted in recessions and even regime collapses which is one of the key dampeners of economic growth after World War II (Hamilton,

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