

الجمهورية الشعبية الديمقراطية الجزائرية
République Algérienne Démocratique et Populaire
وزارة التعليم العالي والبحث العلمي
Ministère de l'Enseignement Supérieur et de la Recherche Scientifique

المدرسة العليا للإعلام الآلي - 08 ماي 1945 - بسيدي بلعباس

Ecole Supérieure en Informatique

-08 Mai 1945- Sidi Bel Abbès



MEMOIRE

En vue de l'obtention du diplôme de **Master**

Filière : **Informatique**

Spécialité : **Systemes d'information et Web (SIW)**

Thème

Statistical and machine learning models for time series forecasting

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Soutenu le : **28/09/2020**

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Année Universitaire : 2019 / 2020

Abstract:

“Time is a natural element that is always present, most real-world data has a temporal component, whether it is measurements of natural processes (weather, sound waves) or man-made (stock market, robotics)”. (Langkvist , 2014) . in almost every field, measurements are performed over time. These observations lead to a collection of organized data called time series. Industries in all sectors generate and use time series. Here comes the role the techniques of time series forecasting in extracting meaningful knowledge from the time series.

Several forecasting models were proposed in the literature. The purpose of this thesis is to describe some famous forecasting time series models used in practice. We have presented two main classes of time series models with their characteristics, advantages and disadvantages. First class is the statistical models like Autoregressive Integrated Moving Average (ARIMA), Exponential Smoothing. the second class is the models based on machine learning and deep learning models such as Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU). Then, the two prediction models (LSTM) and (ARIMA) were compared on their prediction accuracy in two scenarios, given sales data for different products.

The study draws to close that the LSTM model is promising in the field of sales forecasting and it is able to compete with the ARIMA model and has a higher accuracy. The study used evaluation measures RMSE and MAE with a t-test.