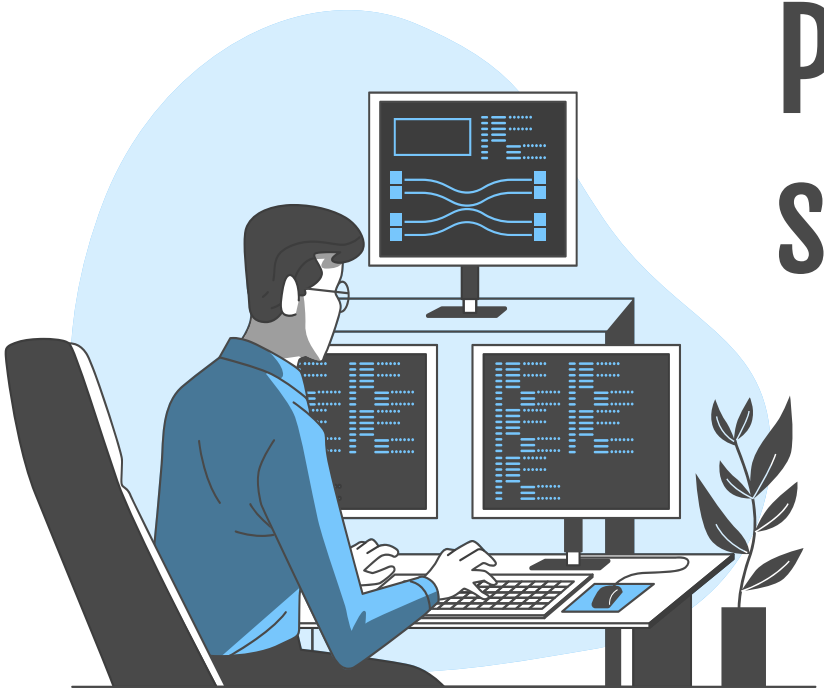
UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

Corso di Laurea Magistrale in Data Science A.A. 2020/2021

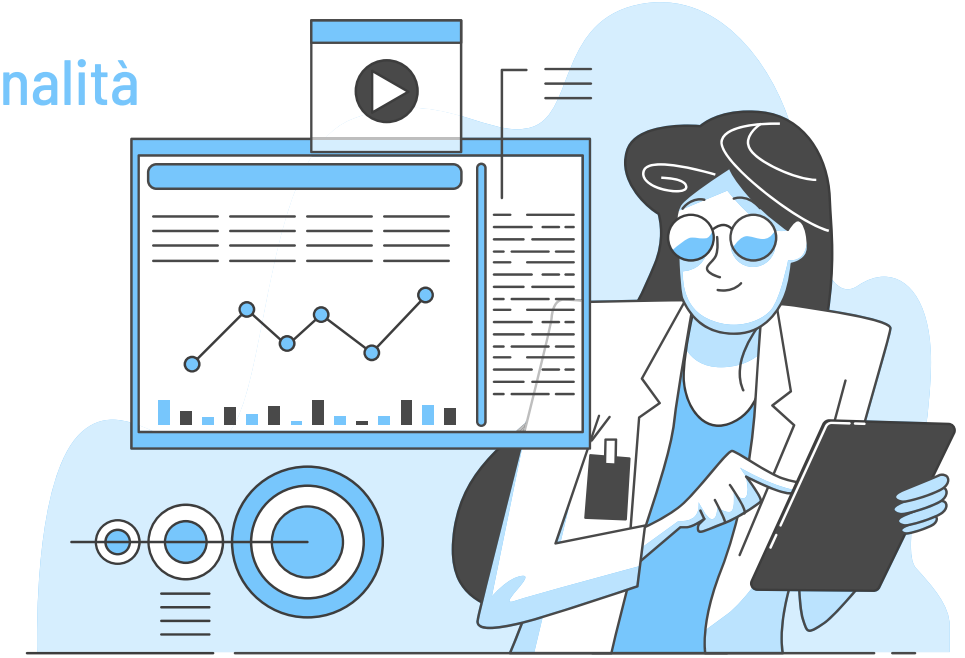
Streaming Data Management and Time Series Analysis



Previsioni su serie storiche

Simone D'Amico - 850369

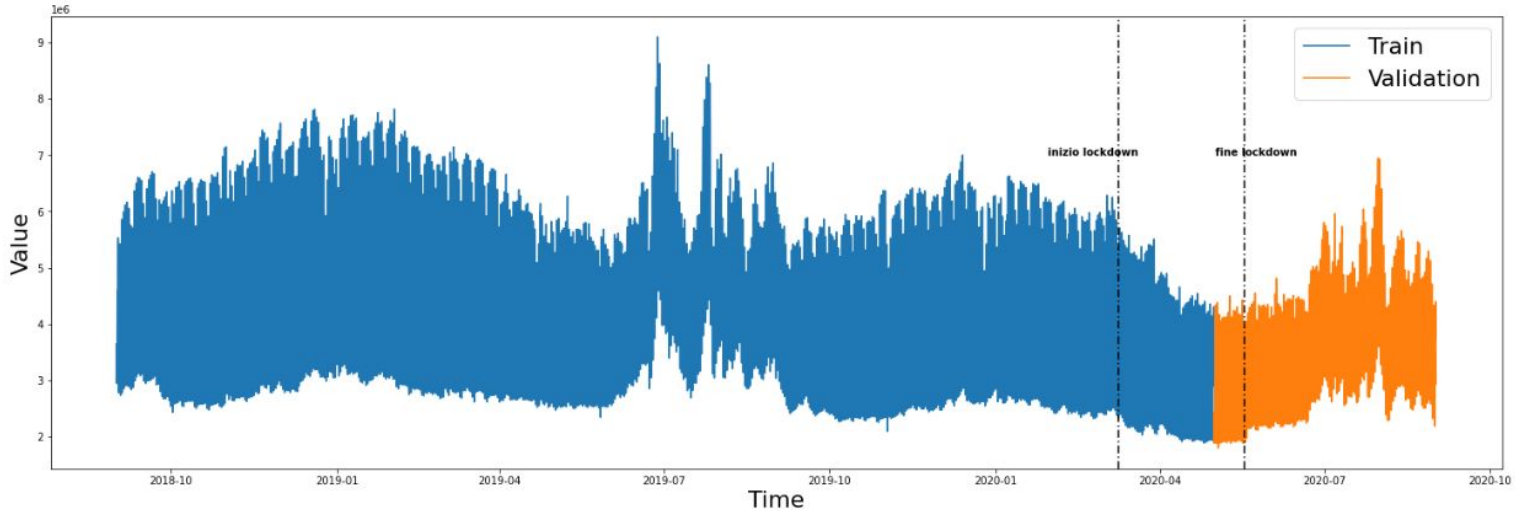
Table of Contents



01
Preprocessing

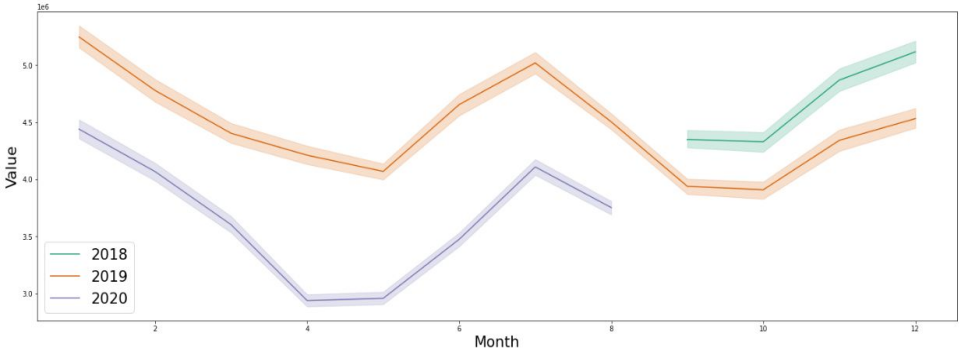
Preprocessing

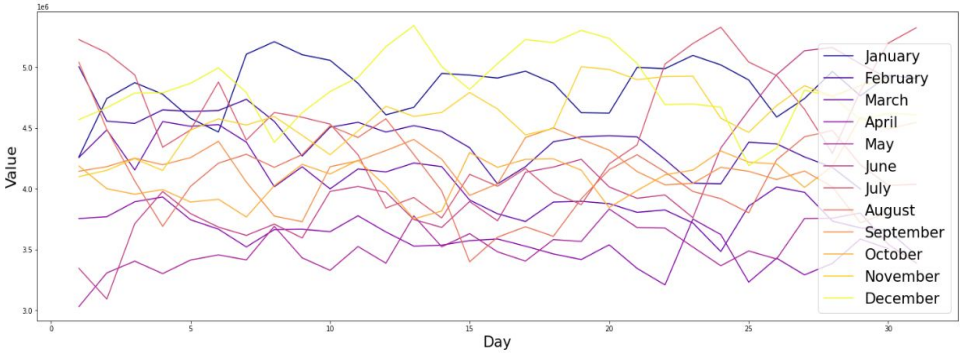
- Dati mancanti:
  Ora solare/legale
  Il giorno 31-05-2020
- Creazione di tre regressori:
  weekend, holiday, lockdown
- Divisione tra train set e validation set

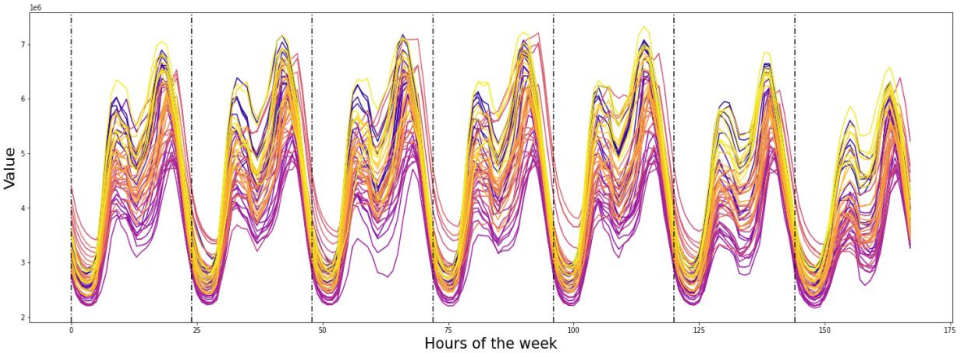


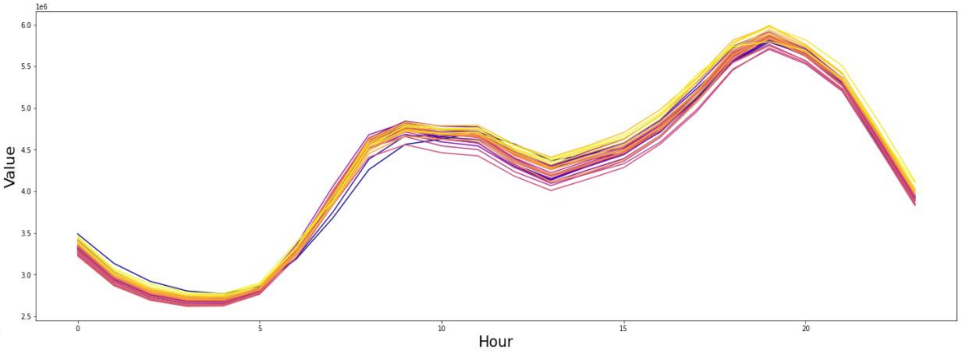
02
Analisi della stagionalità

Analisi stagionalità







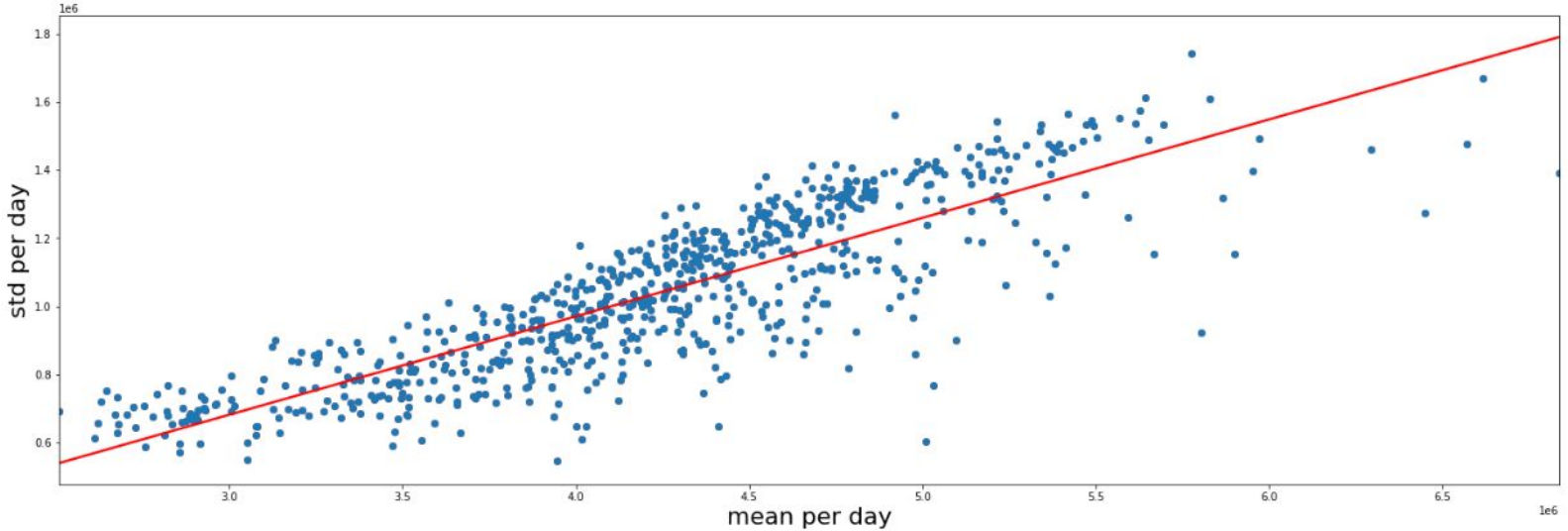


03

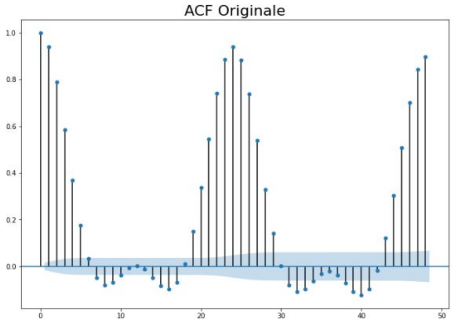
Modello ARIMA

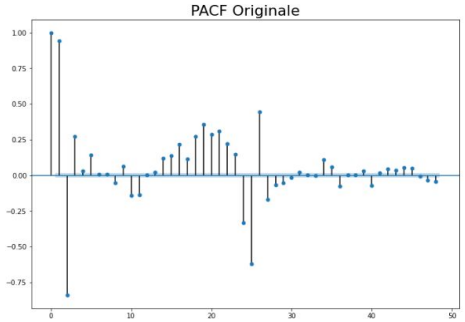
Modello Arima – stazionarietà

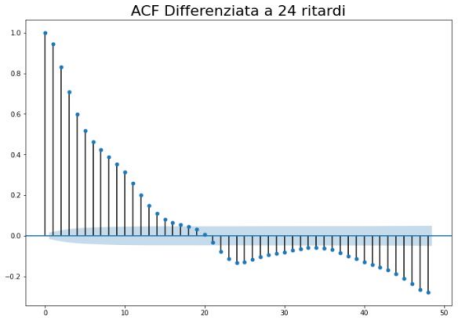
Si nota una certa linearità tra la media e la varianza, applico una trasformazione logaritmica ai dati.

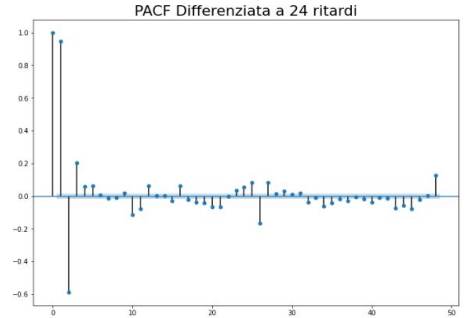


Modello Arima – stazionarietà









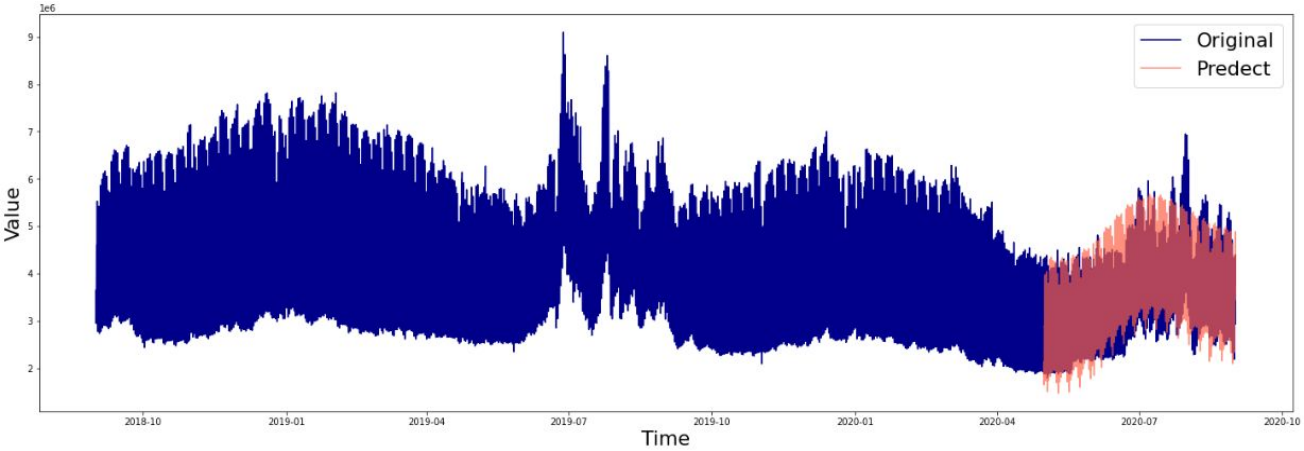
Applico una differenza a 24 lags

Il test ADF rifiuta l'ipotesi nulla e non applico ulteriori differenze

Modello Arima – Selezione

Grid search per coefficienti AR e MA, sinusoidi e regressori.

Modello migliore: no trasformazione logaritmica, $ARIMA(2,0,2)(1,1,1)_{24}$ con 5 armoniche per la stagionalità settimanale e annuale e regressori delle vacanze.



MAE Tain	MAE Val
67206.0	328893.0

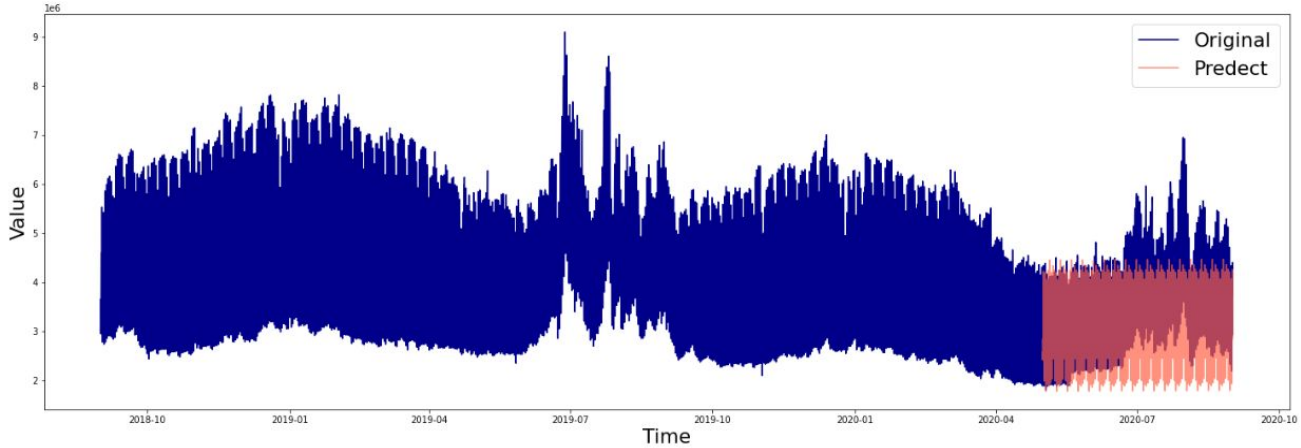
03

Modello UCM

Modello UCM – Selezione

Grid search per trends, ciclo e stagionalità.

Modello migliore: Local Linear Det. Trend + Stagionalità giornaliera e settimanale e regressori per le vacanze



MAE Tain	MAE Val
103945.6	739937.5

03

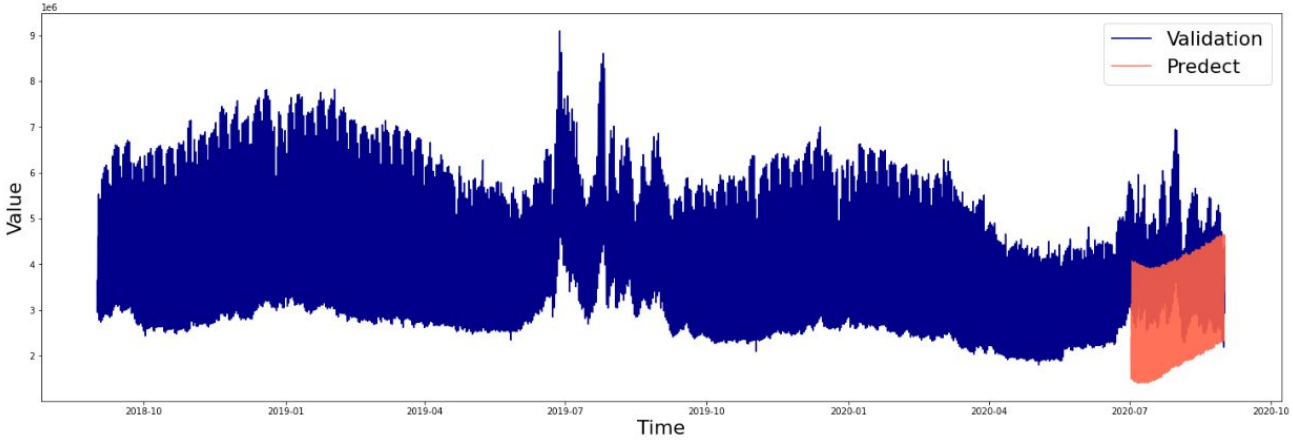
Modello RNN

Modello RNN – Selezione

Provo LSTM e GRU con 2 architetture:

- 1 layer da 128 neuroni
- 1 layer da 64 neuroni
  e 1 layer da 32 neuroni

Modello migliore: GRU con 2 layers



MAE Tain	MAE Val
3149814.3	786970.3

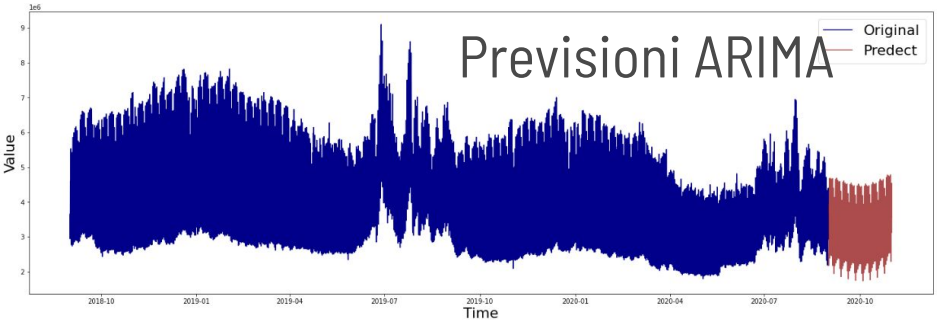
Modello migliore

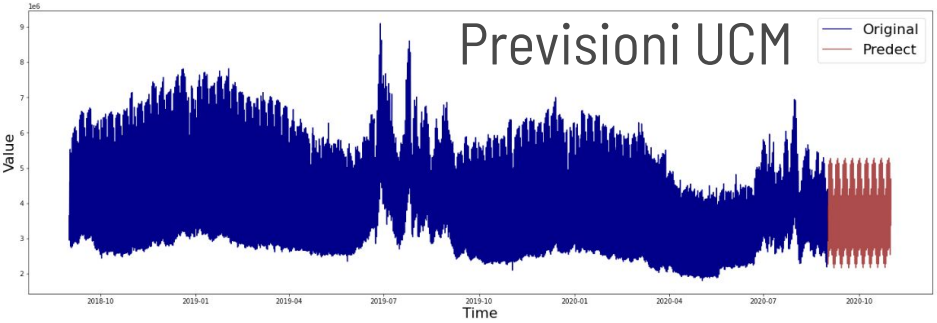
Tra le tre tipologie di modelli, il migliore è ARIMA

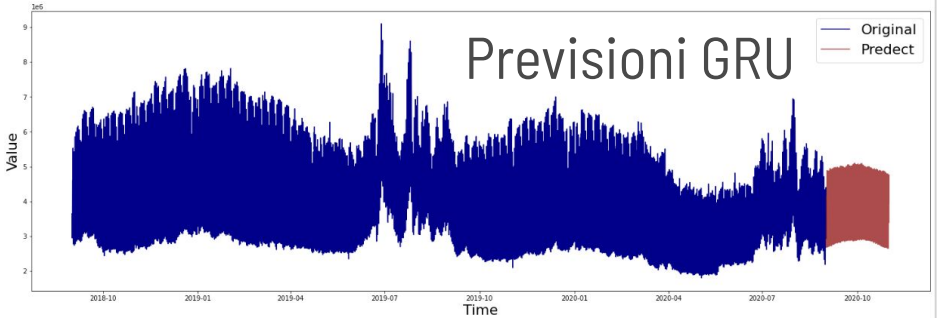
Modello	Mae Train	Mae Validation
Arima	67206.0	328893.0
UCM	103945.6	739937.5
GRU	3149814.3	786970.3

04
Predizioni al buio

Previsioni al buio







Grazie dell’attenzione