

Impact of Environmental Factors

on Acute Myocardial Infarction

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Dataset & Data Preparation

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- **Response variable:** Age Standardised Incidence Rate (ASIR)
- A total of **5** predictors - Humidity, Temperature, Ozone levels, Particulate Matter, Public holidays

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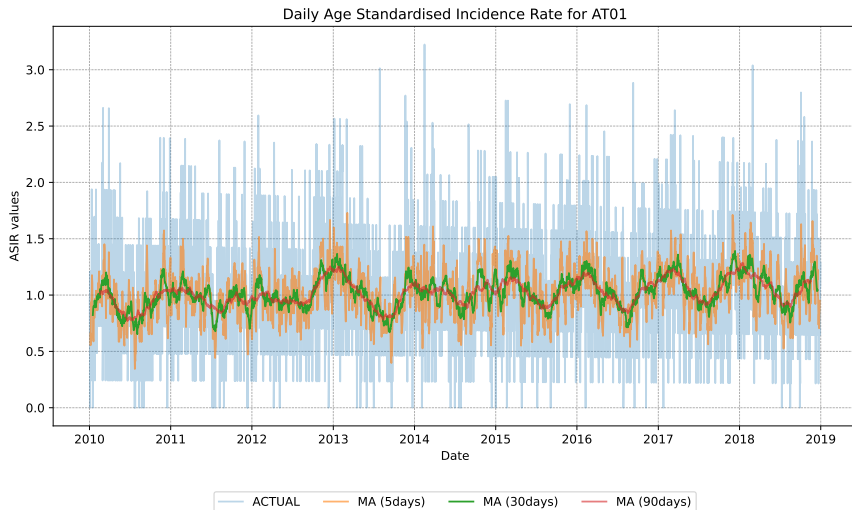
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- Ensures comparability across different age distributions.
- Adjusts for age as a confounding factor, providing a more accurate representation of AMI incidence.

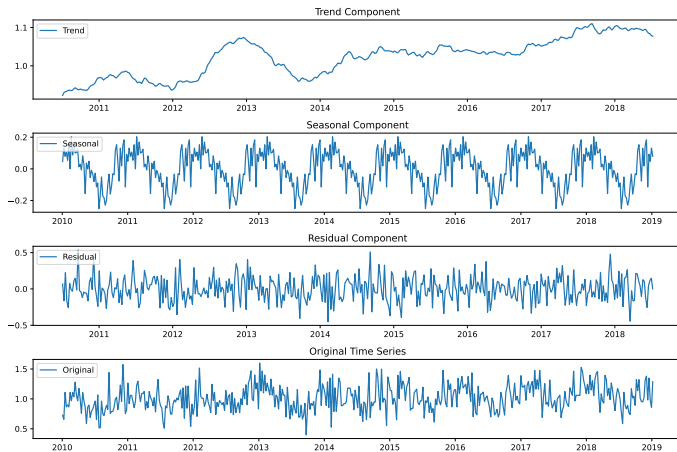
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- Ensures comparability across different age distributions.
- Adjusts for age as a confounding factor, providing a more accurate representation of AMI incidence.
- Allows comparisons between regions or over time periods.

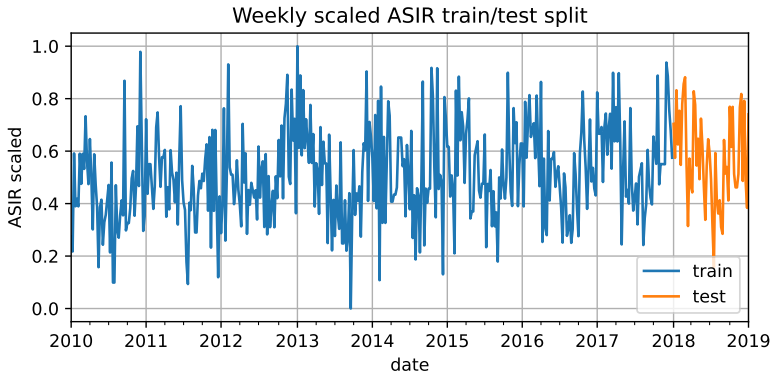
Target Variable - ASIR



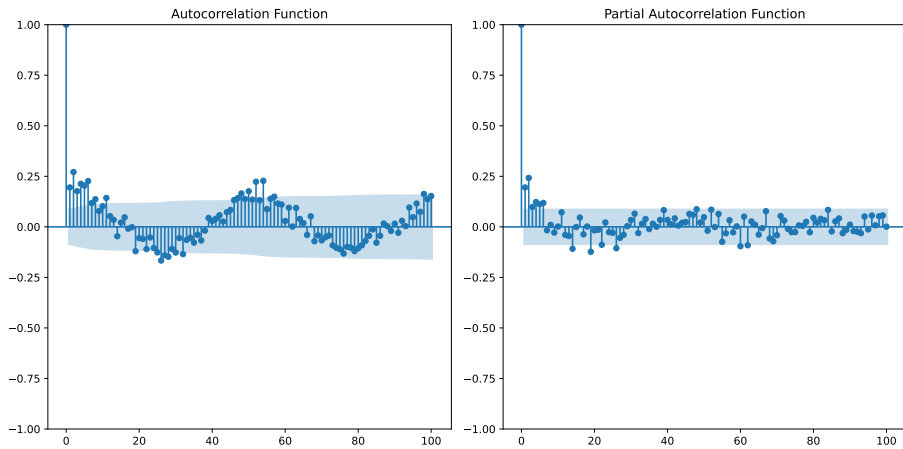
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SARIMAX

SARIMAX model can be represented as:

$$Y_t = \beta X_t + \epsilon_t$$

- Y_t is the observed ASIR at time t ,
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By integrating both temporal and environmental variables, it enables more robust forecasting, taking into consideration seasonality

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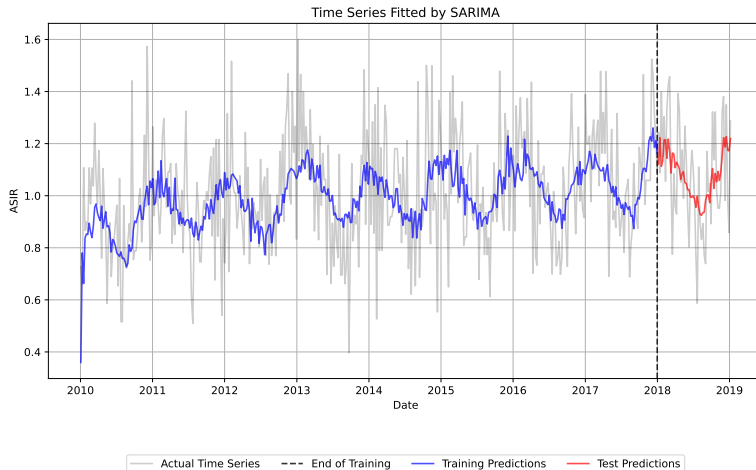
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- LSTM networks are capable of learning long-term dependencies in sequential data, making them suitable for time series forecasting tasks.
- can capture complex patterns and relationships to forecast future ASIR.

Results - SARIMAX



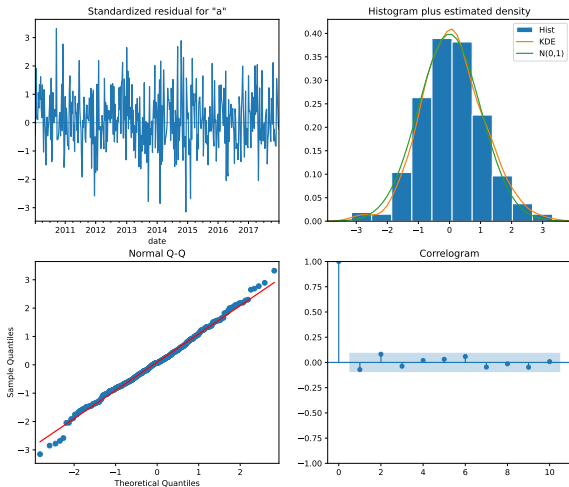
Results - SARIMAX

- Maximum temperature (`max_temp`): A decrease of 1°C in maximum temperature is associated with a decrease of approximately 0.345 units in the Age-Standardized Incidence Rate (ASIR) of AMI.

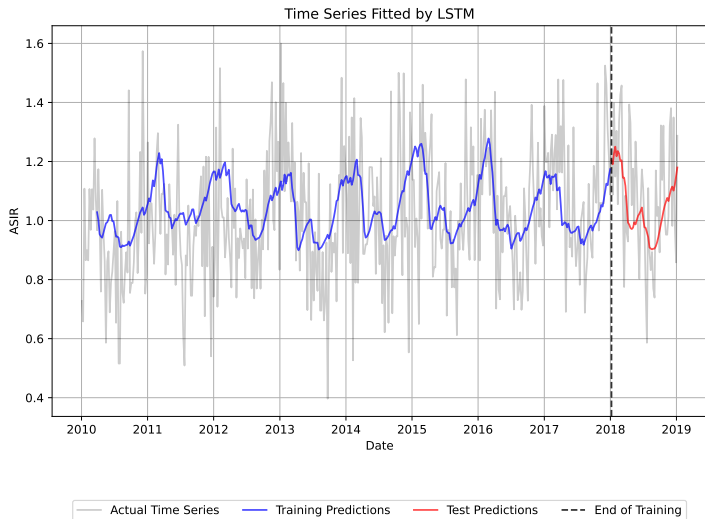
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- Mean PM10 concentration (`mean_PM10`): An increase of $1 \mu\text{g}/\text{m}^3$ in mean PM10 concentration is associated with an increase of approximately 0.146 units in ASIR of AMI.

Diagnostics - SARIMAX



Results - LSTM



Comparison

Table 1: Results

	SARIMAX	LSTM
MAE	0.12	0.15
MSE	0.02	0.03
RMSE	0.15	0.19
MAPE	26.60	14.53

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- SARIMAX outperforms LSTM in terms of both MAE and MSE, making it a more suitable choice for this forecasting task.
- However, the LSTM model exhibits substantially lower AIC and BIC values compared to SARIMAX, indicating a potentially better fit to the data and superior long-term forecasting capabilities

Thank you for your attention