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**ARIMA/SARIMA Model**

Time Series Forecasting

**Time series:** Recorded values or data over regular time intervals (yearly, monthly, daily, etc.). There are 3 time series components:

* *Level:* The average value in the series.
* *Trend*: The increasing or decreasing value in the series.
* *Seasonality*: The repeating short-term cycle in the series.

**Logarithm Transformation:** Helps stabilize the variance of a time series.

**Differencing:** Computechanges between consecutive observations. Helps stabilize the mean of the series by removing changes in the level of a time series, and subsequently reduces trend and seasonality.

**Seasonal Differencing:** Change between an observation and the previous observation from the same season.

**ARIMA/SARIMA model:** Auto Regressive Integrated Moving Average model that tries to explain a time series by analyzing its past values. It **i**s characterized by 6 terms:

Diagrama

Descripción generada automáticamente

**ORDER OF DIFFERENCING (d) in the model:** Its purpose is to make the time series stationary.

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The best order of differentiating is the minimum required to get a near-stationary series which is around a define mean.

**AR(p) model**: Forecast the variable of interest by using a linear combination of the past values of the time series also known as lags. Autoregression means that it is a regression of the variable against itself.

We can the same equation as follows:

**MA(q) model**: Uses past forecast errors in regression-like model to determine Yt.

We can the same equation as follows:

**ARIMA Equation:** Combination of the AR and MA models.

The previous equation can be represented with a backshift notation to make it easier to work with.

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Where:

**SARIMA model:** Seasonal part are like the non-seasonal but involves backshifts of seasonal period. Here is an example of a without a constant, this can be written as:



Additional seasonal terms are multiplied by the non-seasonal terms.

Bibliography:

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