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**Assignment # 01**

**Course : Machine Learning**

**Name: Sami Ahmed**

**Father Name: Nazir Ahmed**

**Section: 8 C**

**Student ID: CSC-20F-152**

**Q1:** Specify what is the In ARIMA in ARIMA Modeling of ML?

**ARIMA:**

ARIMA (Autoregressive Integrated Moving Average) is a statistical method used for time series forecasting, combining three key components:

**1. Autoregressive (AR) Part:**

- Uses past values to predict future values.

- Denoted as AR(p), where 'p' is the number of lagged observations.

**2. Integrated (I) Part:**

- Involves differencing the data to make it stationary.

- The order of differencing is denoted by 'd'.

**3. Moving Average (MA) Part:**

- Models the relationship between an observation and a residual error from a moving average model applied to lagged observations.

- Denoted as MA(q), where 'q' is the number of lagged forecast errors.

**ARIMA Model**

The ARIMA model is expressed as ARIMA(p, d, q), which combines these elements to handle various types of time series data for accurate forecasting. It's widely used in applications like stock price prediction, weather forecasting, and economic analysis.

**Q2:** What is ARIMA Modeling of ML and What is it user for and Why it is becoming popular tool for data scientists?

**ARIMA Modeling in Machine Learning**

ARIMA (Autoregressive Integrated Moving Average) modeling is a widely used statistical method in machine learning for analyzing and forecasting time series data.

**Uses of ARIMA**

ARIMA is primarily used for:

**1. Forecasting Future Values:** Predicting future points in a time series, such as stock prices, sales, or weather conditions.

**2. Understanding Data:** Identifying the underlying patterns and relationships in historical data.

**3. Time Series Analysis:** Decomposing time series into components like trend, seasonality, and noise for better insights.

Why ARIMA is Becoming Popular Among Data Scientists?

**1. Versatility:** ARIMA can model a wide range of time series data with different characteristics, making it applicable across various domains like finance, economics, and environmental science.

**2.Effectiveness:** It provides robust forecasts by accounting for autocorrelations and integrating differencing to handle non-stationary data.

**3. Simplicity and Interpretability**: Despite its powerful capabilities, ARIMA remains relatively simple to implement and interpret, making it accessible to data scientists with different levels of expertise.

**4. Diagnostic Tools:** ARIMA comes with diagnostic tools to check model assumptions and improve accuracy, such as the ACF (Autocorrelation Function) and PACF (Partial Autocorrelation Function) plots.

**5. Integration with Other Methods:** It can be combined with other machine learning techniques and methods to enhance predictive performance, like incorporating ARIMA into hybrid models with neural networks.

**6. Availability of Software:** There are numerous software packages and libraries (like Python's stats models) that provide easy-to-use implementations of ARIMA, aiding data scientists in applying this technique efficiently.

By leveraging ARIMA, data scientists can make informed decisions and accurate forecasts, contributing to its growing popularity in the field of machine learning and data analysis.

-----------------------------------------**The End** -----------------------------------------