STEP 3.1: Auto ARIMA Process

What is Auto ARIMA?
Auto ARIMA automatically finds the best ARIMA model parameters.

Process:
1. Tests multiple parameter combinations
2. Uses information criteria (AIC, BIC)
3. Performs stationarity testing
4. Applies differencing if needed
5. Selects optimal model

Parameters Tested:
• p (AR order): 0 to 5
• d (differencing): 0 to 2
• q (MA order): 0 to 5
• Seasonal: (P,D,Q)[12]

Benefits:
• Saves time and effort
• Reduces human error
• Finds optimal parameters
• Handles non-stationarity

STEP 3.2: Selected Model

Best Model Found:
ARIMA(0, 1, 2) x SARIMA(1, 0, 0, 12)

Model Parameters:
• Non-seasonal: ARIMA(0,1,2)
• Seasonal: SARIMA(1,0,0)[12]
• Total Parameters: 16

Model Quality:
• AIC: 1603.551
• BIC: 1615.051

Interpretation:
• p=0: 0 autoregressive terms
• d=1: 1 differencing operations
• q=2: 2 moving average terms
• Seasonal: 1 seasonal AR terms

STEP 3.3: Parameter Search Space

Search Strategy:
• Stepwise search for efficiency
• Tests combinations systematically
• Uses AIC for model selection
• Handles seasonal patterns

Search Space:
• Non-seasonal: 6 x 3 x 6 = 108 combinations
• Seasonal: 3 x 3 x 3 = 27 combinations
• Total: 2,916 possible models

Selection Criteria:
• Primary: AIC (Akaike Information Criterion)
• Secondary: BIC (Bayesian Information Criterion)
• Lower values = better model

Optimization:
• Balances model fit vs complexity
• Penalizes overfitting
• Ensures parsimony

STEP 3.4: Model Interpretation

ARIMA Model Components:

Autoregressive (AR) - p=0:
• Uses 0 previous values
• Captures short-term dependencies
• Not used

Integrated (I) - d=1:
• 1 differencing operation
• Makes data stationary
• Removes trends and seasonality

Moving Average (MA) - q=2:
• Uses 2 previous error terms
• Captures random shocks
• Present

Seasonal Component:
• 1 seasonal AR terms
• Captures yearly patterns
• Handles seasonal variations