

Data Analysis: Statistical Modeling and Computation in Applications

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sandipan_dey >

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7. ARMA Model

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A time series $\{X_t\}_{t\geq 1}$ is a **moving average autoregressive process** of orders p,q, denoted by $\mathsf{ARMA}\,(p,q)$, if it is a sum of an $\mathsf{AR}\left(p\right)$ component with an $\mathsf{MA}\left(q\right)$ component:

$$X_t = \phi_1 X_{t-1} + \phi_2 X_{t-2} + \dots + \phi_p X_{t-p} \ + W_t + \theta_1 W_{t-1} + \theta_2 W_{t-2} + \dots + \theta_q W_{t-q}$$

A time series $\{X_t\}_{t\geq 1}$ is an $\mathsf{ARIMA}\,(p,d,q)$ model if the difference of order d, $\{
abla^d X_t\}_{t\geq 1}$, is an $\mathsf{ARMA}\left(p,q\right)$ model.

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