Airpassengers

① AR1:

$$\log(\text{airp})_i \mid \mathcal{X}, \theta \sim N(\eta_i, \sigma^2) \quad \to \frac{1}{2.37\times10^4}$$

$$\eta_i = \beta_0 + \boxed{\beta\, year} + u_i$$

N N N N

$$u_i \overset{d}{=} \rho u_{i-1} + \varepsilon_i \quad \therefore u_i \overset{d}{=} 0.748\, u_{i-1} + \varepsilon_i$$

$$u_1 \sim N\Big(0, \underbrace{[\tau^{\varepsilon}(1-\rho^2)]}_{K}^{-1}\Big) \therefore u_1 \sim N\left(0, \frac{1}{41}\right)$$

log(airp)$_i$

② Seasonal:

$$\log(\text{airp})_i \mid \mathcal{X}, \theta \sim N(\eta_i, \sigma^2) \quad \to 1/891$$

independent a priori but dependent a posteriori

$$\eta_i = \beta_0 + \beta year + u_i$$

$$u_i = ??$$

$$\begin{bmatrix} u_1 \\ u_2 \\ \vdots \\ u_{144} \end{bmatrix} = \underline{u}$$

$$\therefore \pi(\underline{u} \mid \tau) \propto \tau^{\frac{n-m+1}{2}} \exp(\underline{u}^T Q \underline{u})$$

144, 12

where $Q = \tau \boxed{R}$ depends on m

$\tau \to$ 18068.39

③ RW1: (CAR1 with $\rho = 1$)

$$\log(\text{airp})_i \mid \mathcal{X}, \theta \sim N(\eta_i, \sigma^2) \quad \to \frac{1}{22038\ldots}$$

$$\eta_i = \beta_0 + \beta year + u_i$$

where $u_i - u_{i-1} \sim N(0, \tau^{-1})$ — 3.84

$$\therefore u_i \overset{d}{=} u_{i-1} + \varepsilon_i \quad \to \varepsilon_i \sim N(0, \tau^{-1})$$

④ RW2: Does not work → smooths too much

$$\log(\text{airp})_i \mid \mathcal{X}, \theta \sim N(\eta_i, \sigma^2) \quad 1/54.34$$

$$\eta_i = \beta_0 + \beta year + u_i$$

$$u_i - 2u_{i+1} + u_{i+2} \sim N(0, \tau^{-1})$$

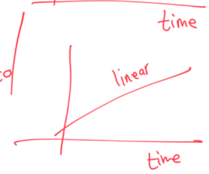
18 6975)

* RW1 ($\tau \to \infty$) reduces to

Scale.model = TRUE

* RW2 ($\tau \to \infty$) reduces to

Scale.model = TRUE



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