Latent Gaussian Process Spatial Model

- Binomial model for public opinion with spatial demography.

$$y_{it} \sim \text{Binomial}(\theta_{it}, N_{it})$$

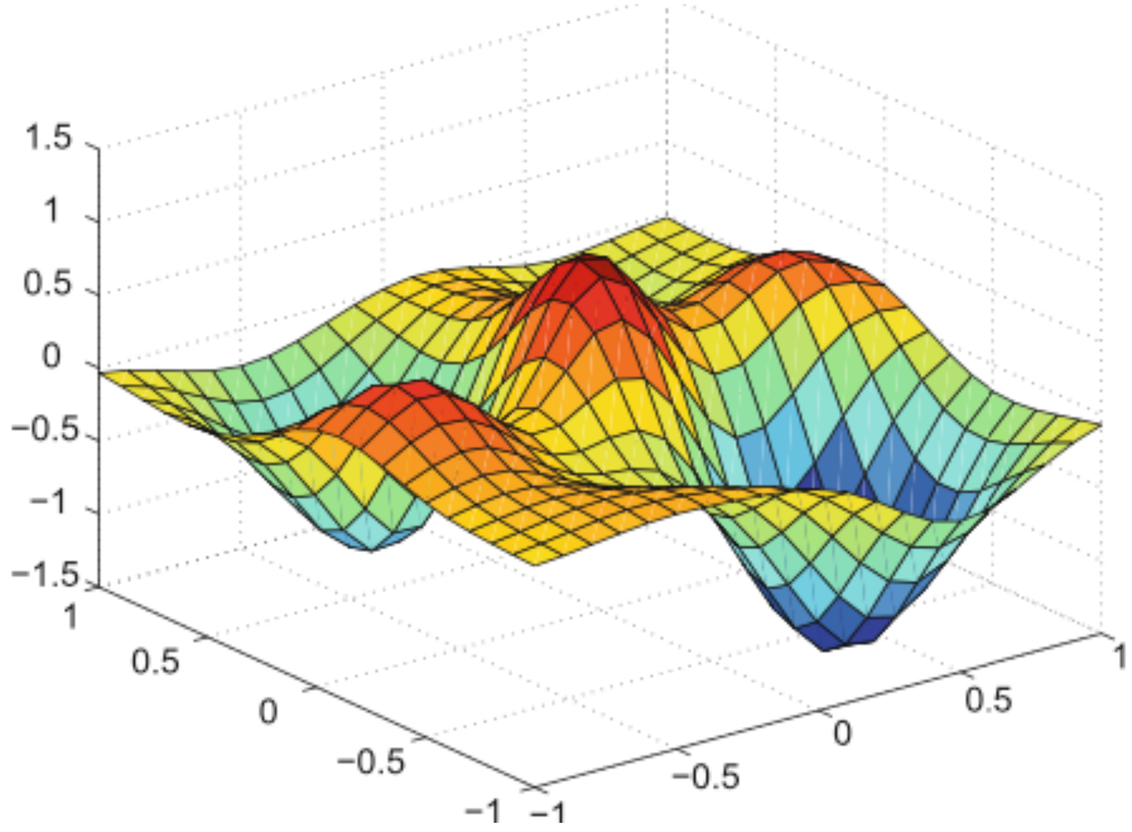
$$\theta_{it} = \Phi(f_{it}) = \int_{-\infty}^{f_{it}} \mathcal{N}(0,1)dz$$

$$f_{it} \sim \mathbb{GP}(\mu, K)$$

$$\mu(x) = [\text{lon,lat,race,gender,year}]^T \mathbf{w}$$

$$K(x, x') = \exp(-\sum_d ||x_d - x'_d||^2 / \ell_d^2)$$

- Predict opinion for new county new demography.

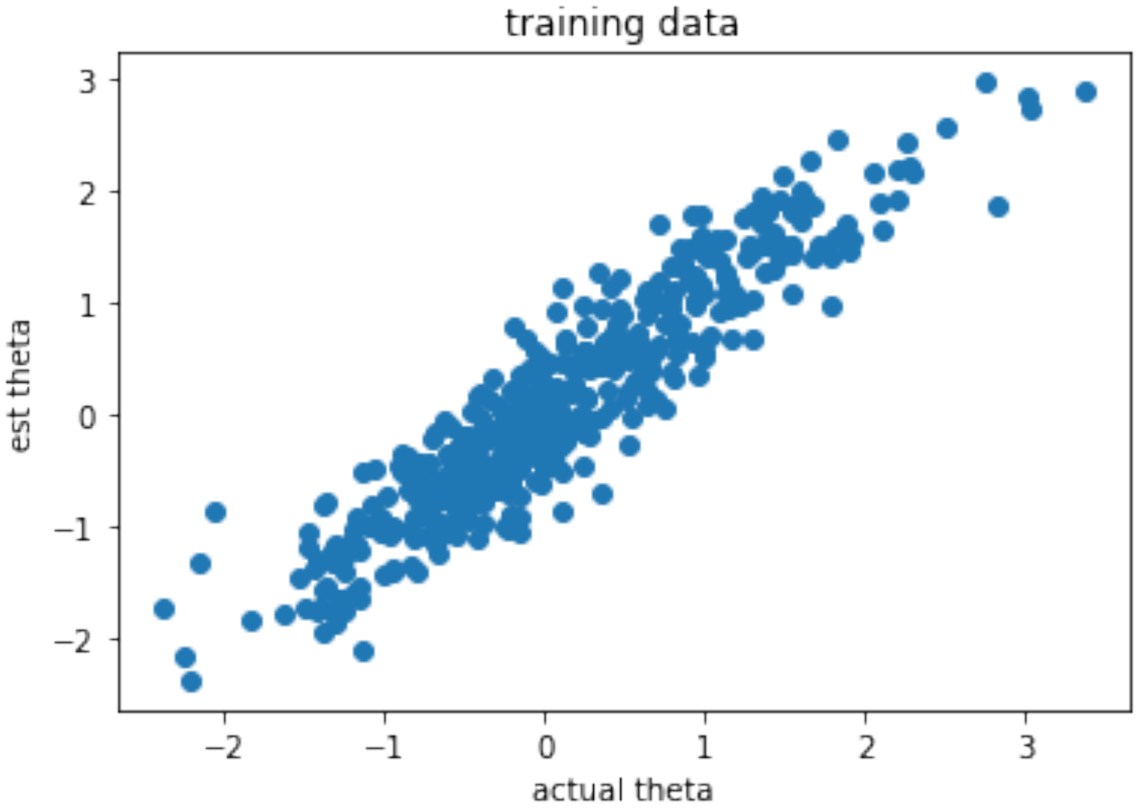


Gaussian process estimation of spatial surface.

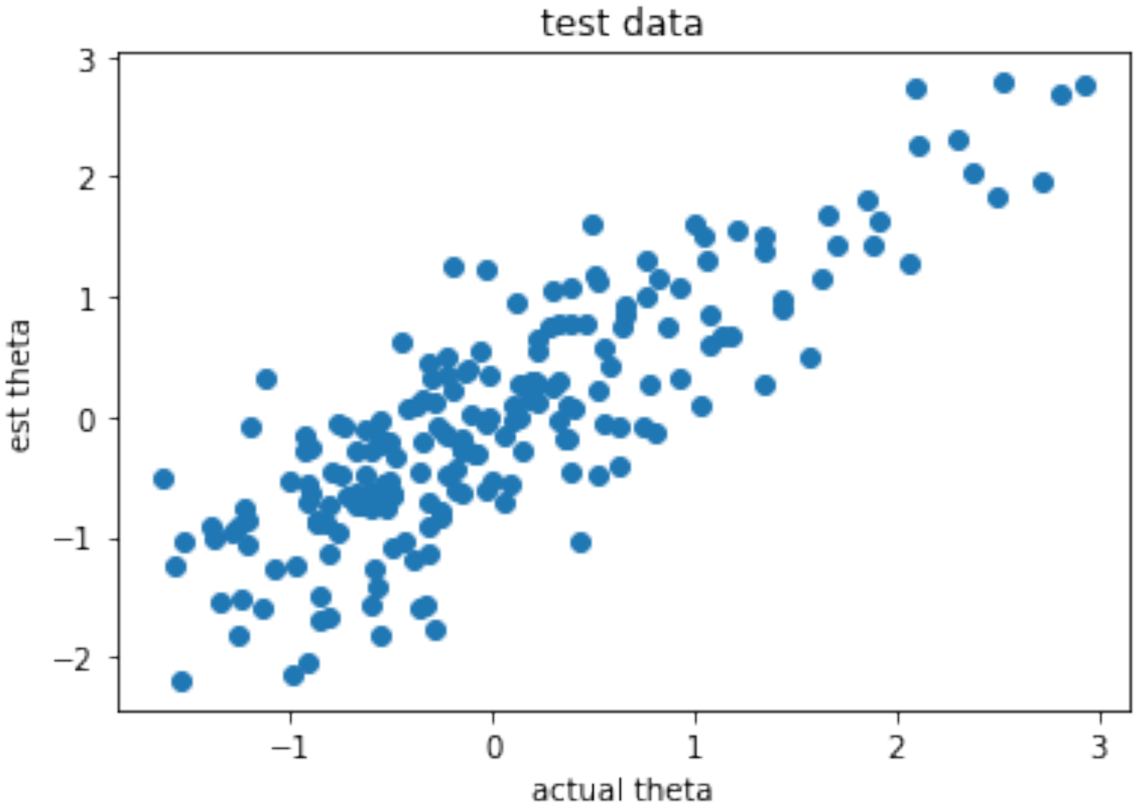
Ramakrishnan et al. (2008). Gaussian Process Models in Spatial Data Mining.

Preliminary Results

Length scale	latitude	longitude	genderMale	genderFe	genderNonb	raceWhite	raceBlack	raceHispanic	raceAsian	raceOther	year
Actual	0.5	0.5	2	2	2	2	2	2	2	2	0.5
Est	0.48	0.31	2.08	1.40	1.51	1.61	1.63	1.90	0.99	1.36	0.56



Train correlation: 0.930



Test correlation: 0.837