

# Lane Assignment

2011.11.13

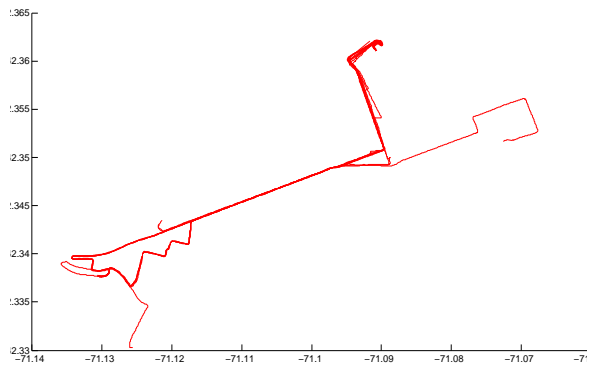
## 0. Intro

Observation of shared road segments: how to model it?



Figure 1: Beacon ST

Figure 2: 15 routes



## 1. Independent Mixture of Gaussian

**Model:**

$$\mathbf{x}=(\text{lat},\text{lon})|z_x \sim \sum_{k=1}^K \delta(z_x = k)\mathcal{N}(\mu_k, \Sigma_k)$$

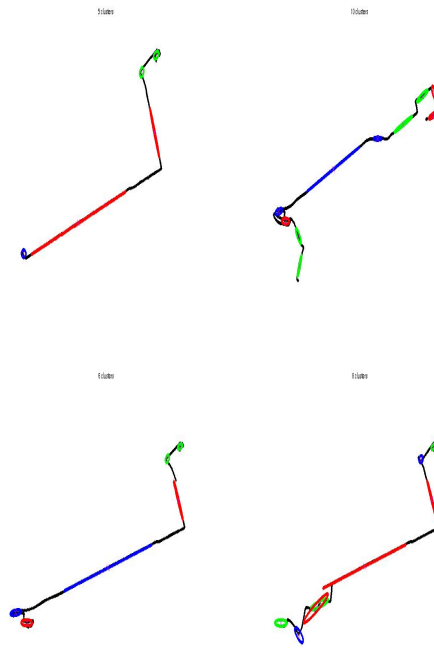
where:

$z_x$  is the road segment assignment of  $\mathbf{x}$ ,

**Algo:**

EM

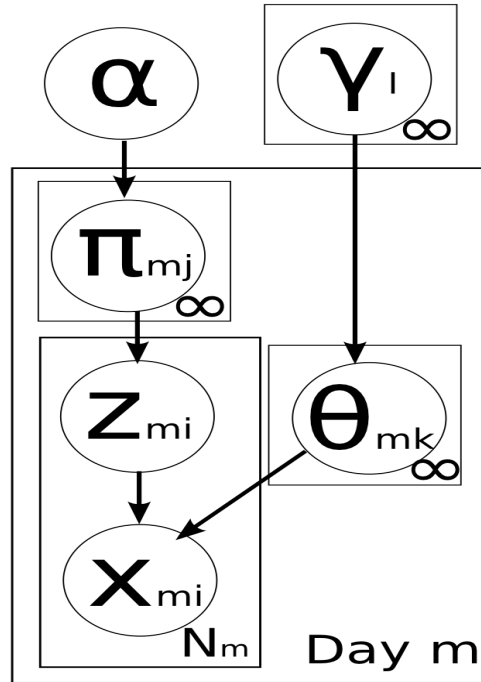
Figure 3: independent MoG model



## 2) Mixture of Gaussian with shared prior

### 2.1) Graphical Model:

Figure 4: Graphical Model



$\theta_{mk} : (\mu_{mk}, \sigma_{mk})$   
 $\gamma_l : (\mu_l, \text{Inv-Wishart}(l))$   
 $\pi_{mj} | \alpha \sim GEM(\alpha)$   
 $z_{mi} | \{\pi_j\}_{j=1}^{\infty} \sim \pi_{z_{mi}}$   
 $x_t | \{\theta_{mk}\}_{k=1}^{\infty}, z_{mi} \sim \mathcal{N}(\mu_{z_{mi}}, \Sigma_{z_{mi}})$   
 $\Sigma_{mk} \sim \text{Inv-Wishart}(k)$   
 $\mu_{mk} \sim \mathcal{N}(k)$

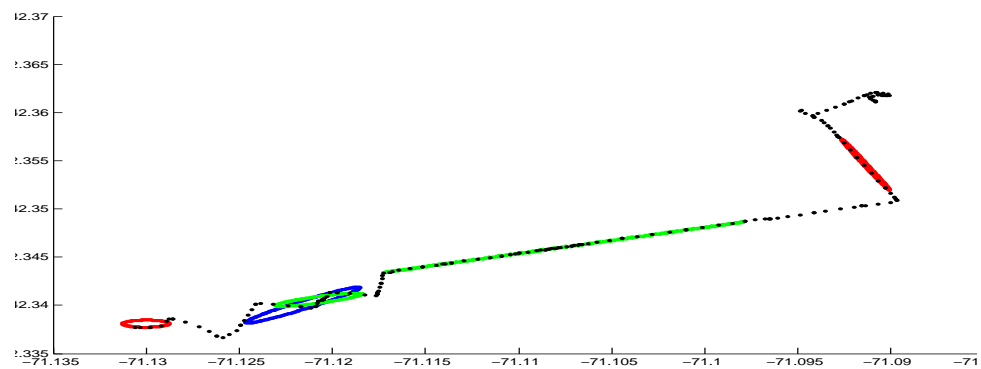
**Algo:**

Meanfield

## 2.2) Result

### 2.2.1) Shared topics

Figure 5: Comparison Result



### 2.2.2) Rate of KL divergence

Figure 6: Comparison Result

