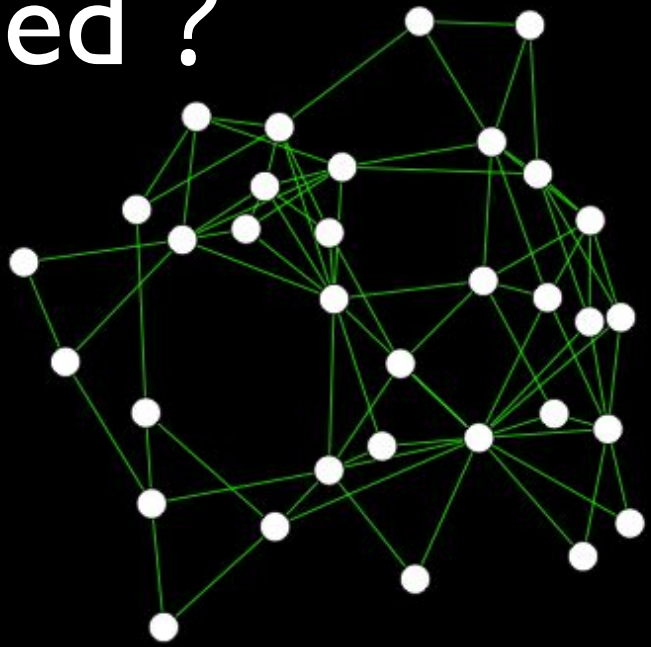
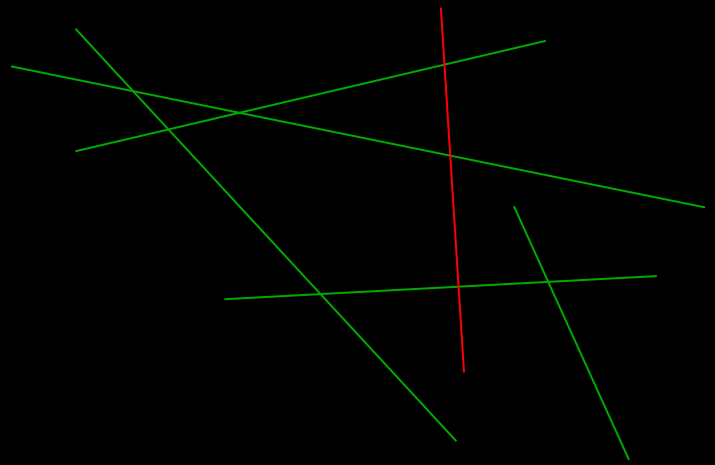
How can human movement be modelled ?

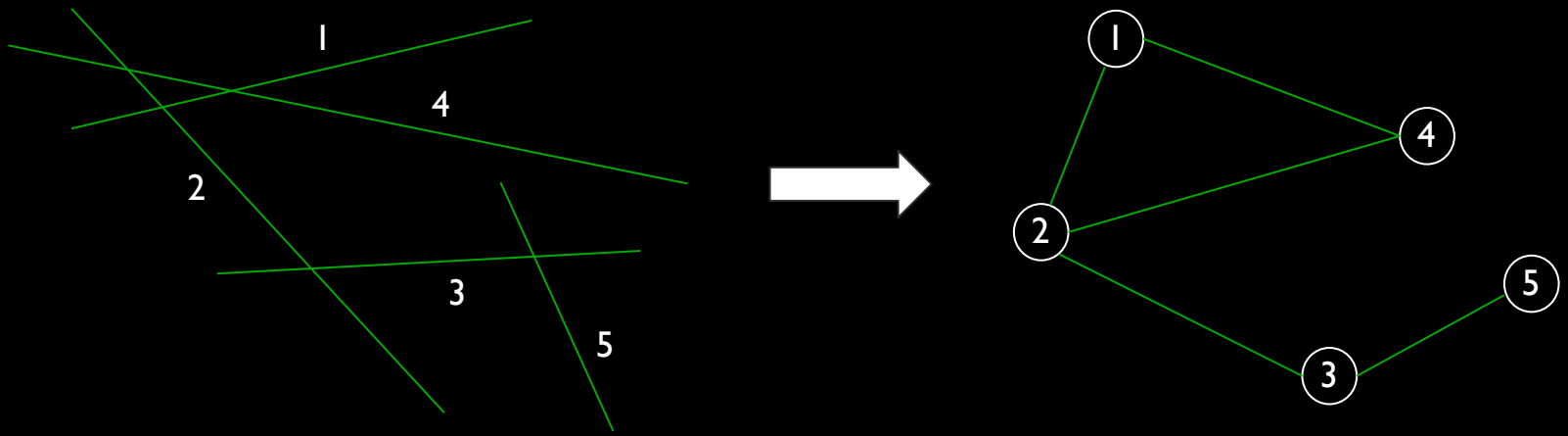


Soma Suzuki

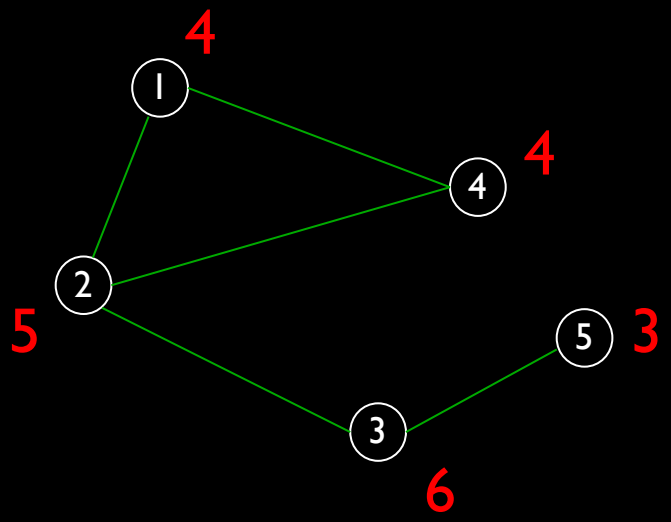
Context



Context



Context

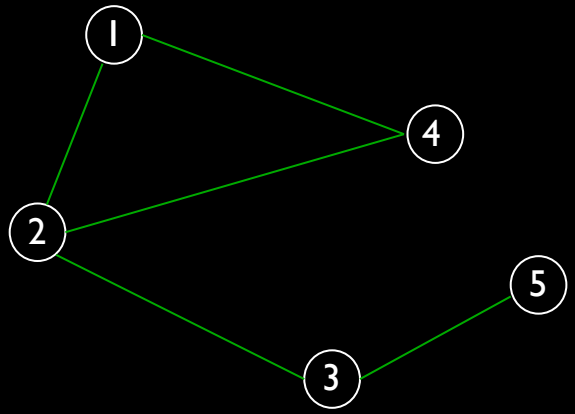


(Hillier '93)

$$\sum_{s=1}^{k} s \times N_s$$

② $3 \times 1 + 1 \times 2 = 5 \quad (if\ s = 2)$

Let’s learn from human



Imitation Learning

Expert trajectory dataset

$$D = \{\zeta_1, \zeta_2 \ldots\ldots \zeta_m\}$$

Reward Function

Maximum Entropy Inverse Reinfocement Learning

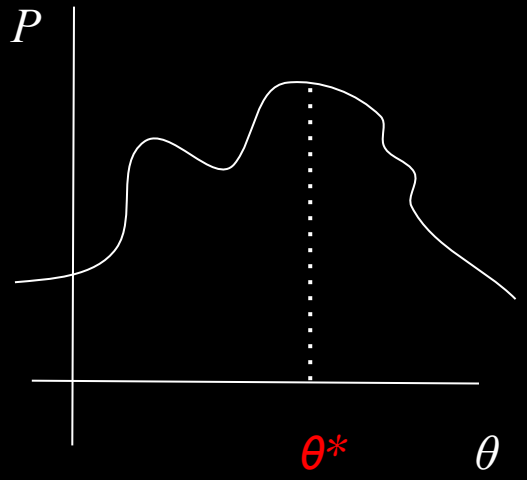
(Ziebart '08)

$$D = \{\zeta_1, \zeta_2 \ldots\ldots \zeta_m\}$$

$$P_\theta(\zeta) = \frac{1}{Z} \exp(R_\theta(\zeta))$$

$$Z = \oint \exp(R\theta(\zeta))$$

$$\max_\theta \underbrace{\sum_{\zeta \in D} \log P_\theta(\zeta)}_{L(\theta)}$$



Maximum Entropy Inverse Reinfocement Learning

(Ziebart '08)

Algorithm

$\theta_0 \leftarrow RewardParameterInitialization$

$for\ i = 1 : N$

$R_i \leftarrow UpdateReward(\theta_i)$

$\pi_i \leftarrow UpdatePolicy(R_i)$

$E \leftarrow PolicyPropagation(\pi_i)$

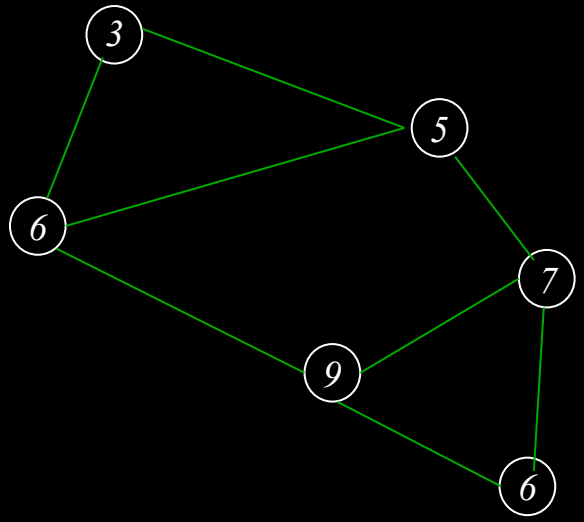
$Compute\ \nabla L(\theta)$

$\theta_0 \leftarrow UpdateRewardParameter(\nabla L(\theta))$

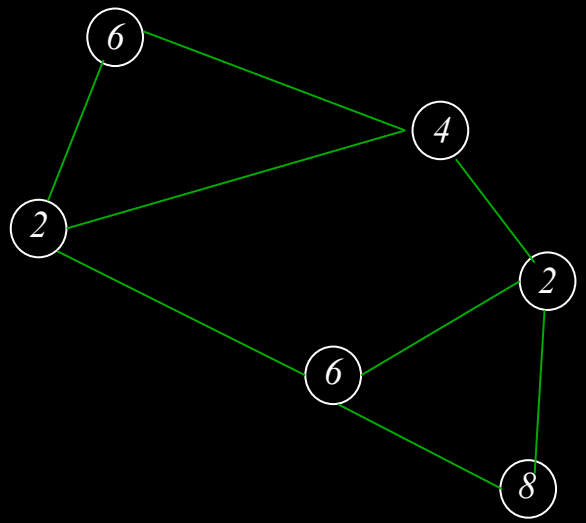
Evaluation

Correlation

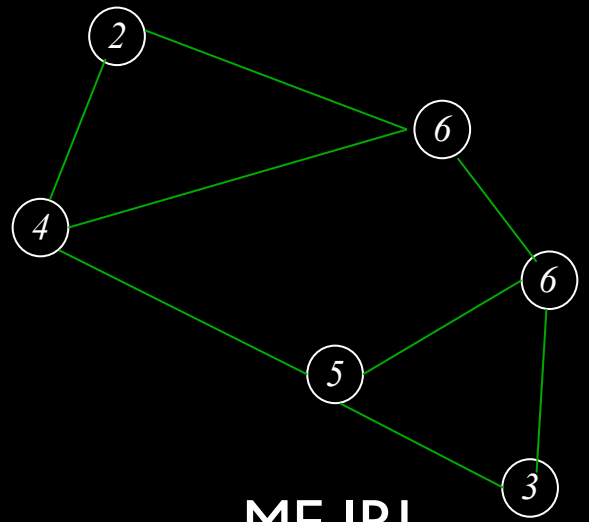
Correlation



Connectivity Graph



Human Movement



ME IRL

Problem that I need to overcome

Collecting data pertaining to individual walking paths is very challenging (Torrens '10)

Questions?