Mobile Robots and Autonomous Vehicles
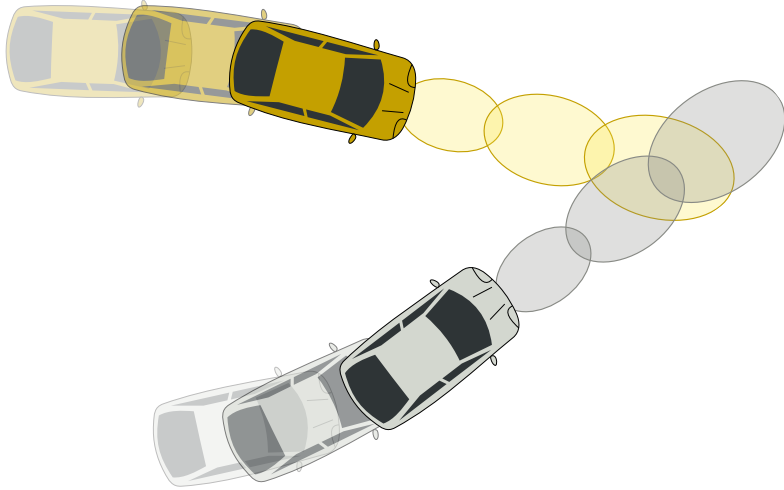
Week 5: Behavior Modeling and Learning

- Introduction

Dizan Vasquez

informatiques *mathématiques*
Inria

Robots in human environments
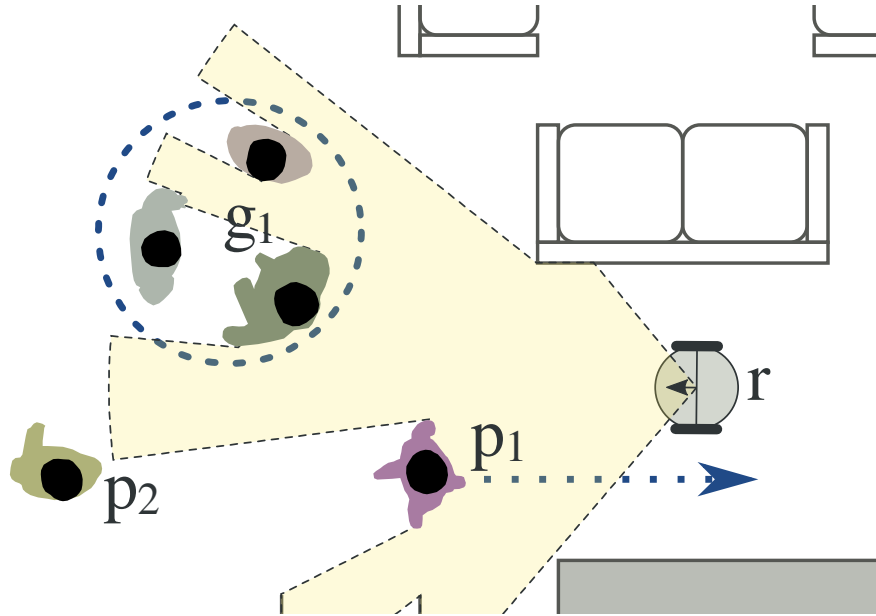
Intelligent Cars

Predicting human motion

- Input: sensor readings

- Output: Future people states (i.e. position, velocity)

Predicting human motion

- Input: sensor readings

- Output: Future people states (i.e. position, velocity)

> What about perception, goals and internal state?

"Ideal" approaches

Physical Stance

- State: position and velocity

- Model: Kinematic & dynamic equations

Intentional Stance

- State: intentions, activity, mood

- Model: finite automata

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> Precise but does not work
> In the long term

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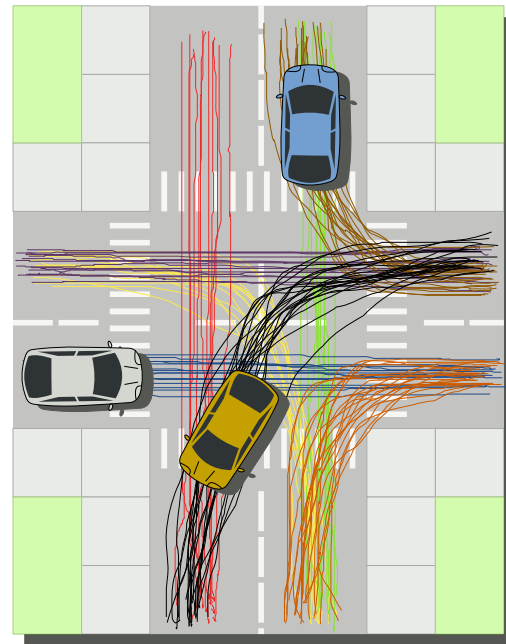
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Intentional Stance

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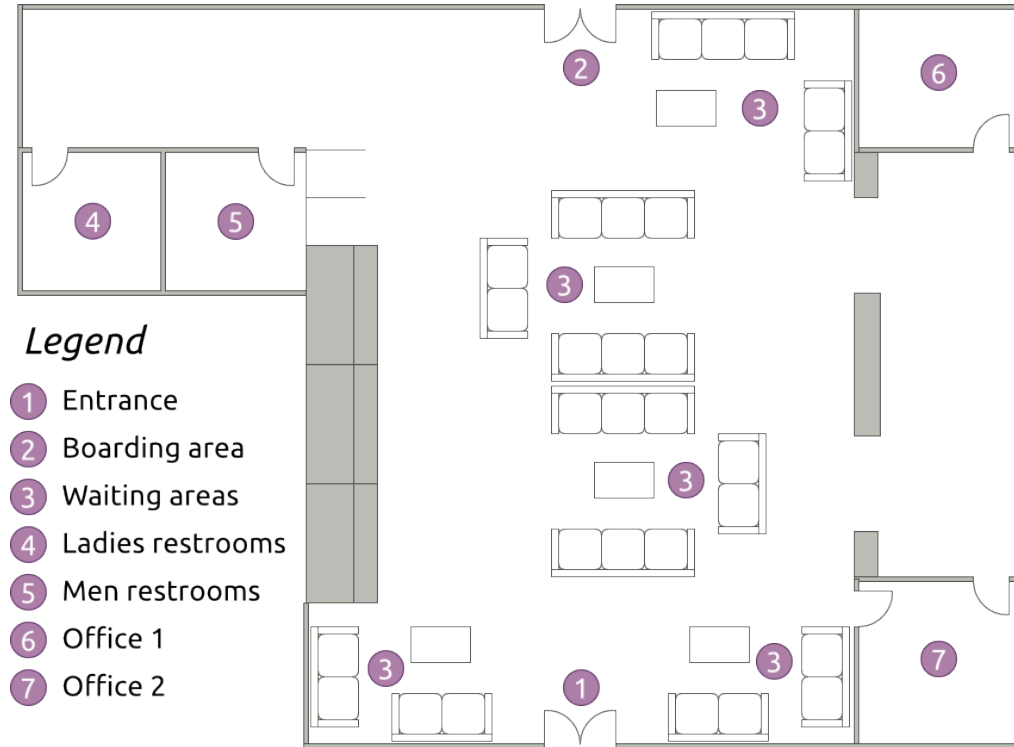
- Model: finite automata

Works in the long term but
no physical interpretation
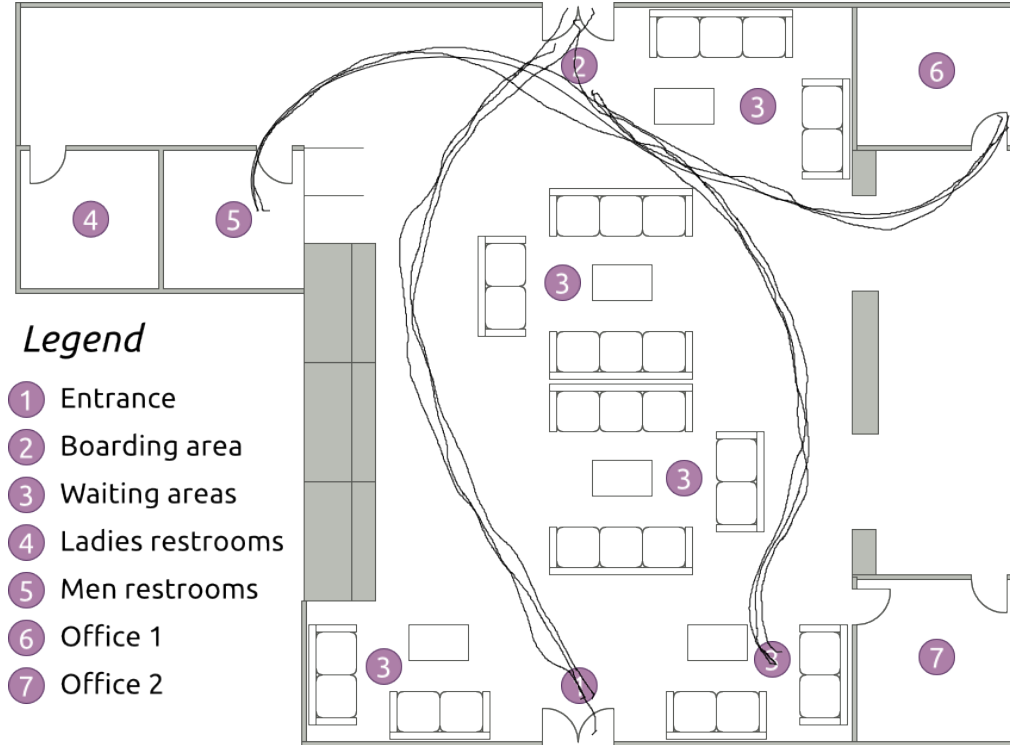
Typical motion patterns

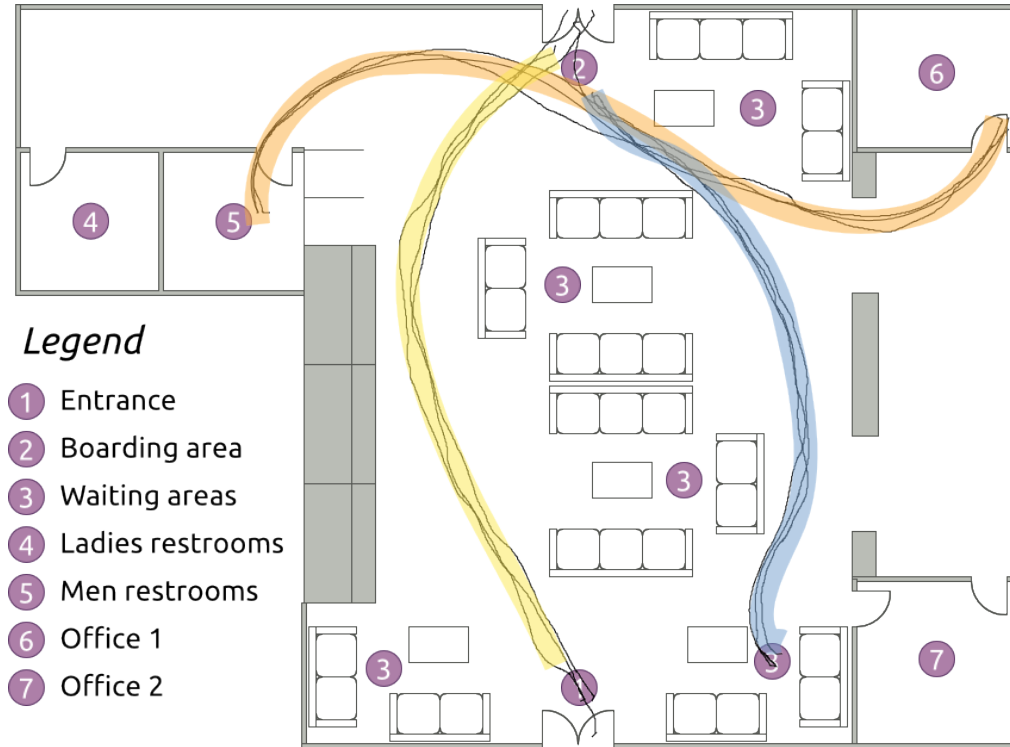- State: discretized position and velocity

- Model: typical trajectories

Learning typical motion patterns

7

Learning typical motion patterns

Legend
1. Entrance
2. Boarding area
3. Waiting areas
4. Ladies restrooms
5. Men restrooms
6. Office 1
7. Office 2

Learning typical motion patterns

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Learning typical motion patterns

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7

Course structure

- EM Clustering

- Learning typical trajectories

- Bayesian filter inference

- From trajectories to discrete time-state models

- Predicting Human Motion

- Typical Trajectories: drawbacks

- Other approaches: Social Forces

- Other approaches: Planning-based approaches