

SEARCH



RESOURCES

CONCEPTS

- ✓ 1. Introduction and Overview
- ✓ 2. I/O Recap
- ✓ 3. Model-Based vs Data-Driven A...
- ✓ 4. Which is Best?
- ✓ 5. Data Driven Example - Trajecto...
- ✓ 6. Trajectory Clustering 2 - Online...
- ✓ 7. Thinking about Model Based A...
- ✓ 8. Frenet Coordinates
- ✓ 9. Process Models
- ✓ 10. More on Process Models
- ✓ 11. Multimodal Estimation
- ✓ 12. Summary of Data Driven an...
- ✓ 13. Overview of Hybrid Approach...
- ✓ 14. Intro to Naive Bayes
- ✓ 15. Naive Bayes Quiz
- ✓ 16. Implement Naive Bayes C++
- 17. Implement Naive Bayes C++ (...)
- 18. Conclusion

Knowledge

Get learning questions answered

Student Hub

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0 1 2 3 4
timestep

2. Model Based Approaches

You can think of model based solutions to the prediction problem as also having a \mathbf{w} component. In that view, this approach requires:

1. *Defining* process models (offline).
2. *Using* process models to compare driver behavior to what would be expected.
3. *Probabilistically classifying* driver intent by comparing the likelihoods of various models using a multiple-model algorithm.
4. *Extrapolating* process models to generate trajectories.

2.1 Defining Process Models

You saw how process models can vary in complexity from very simple...

$$\begin{bmatrix} \dot{s} \\ \dot{d} \end{bmatrix} = \begin{bmatrix} s_0 \\ 0 \end{bmatrix} + \mathbf{w}$$

to very complex...

$$\begin{bmatrix} \ddot{s} \\ \ddot{d} \\ \ddot{\theta} \end{bmatrix} = \begin{bmatrix} \dot{\theta} \dot{d} + a_s \\ -\dot{\theta} \dot{s} + \frac{2}{m}(F_{c,f} \cos \delta + F_{c,r}) \\ \frac{2}{I_z}(l_f F_{c,f} - l_r F_{c,r}) \end{bmatrix} +$$

2.2 Using Process Models

Process Models are first used to compare a target vehicle's observed behavior to what we would expect for each of the maneuvers we've created models for. The pictures below show how process models are used to calculate these likelihoods.

