Driving Behavior Learning

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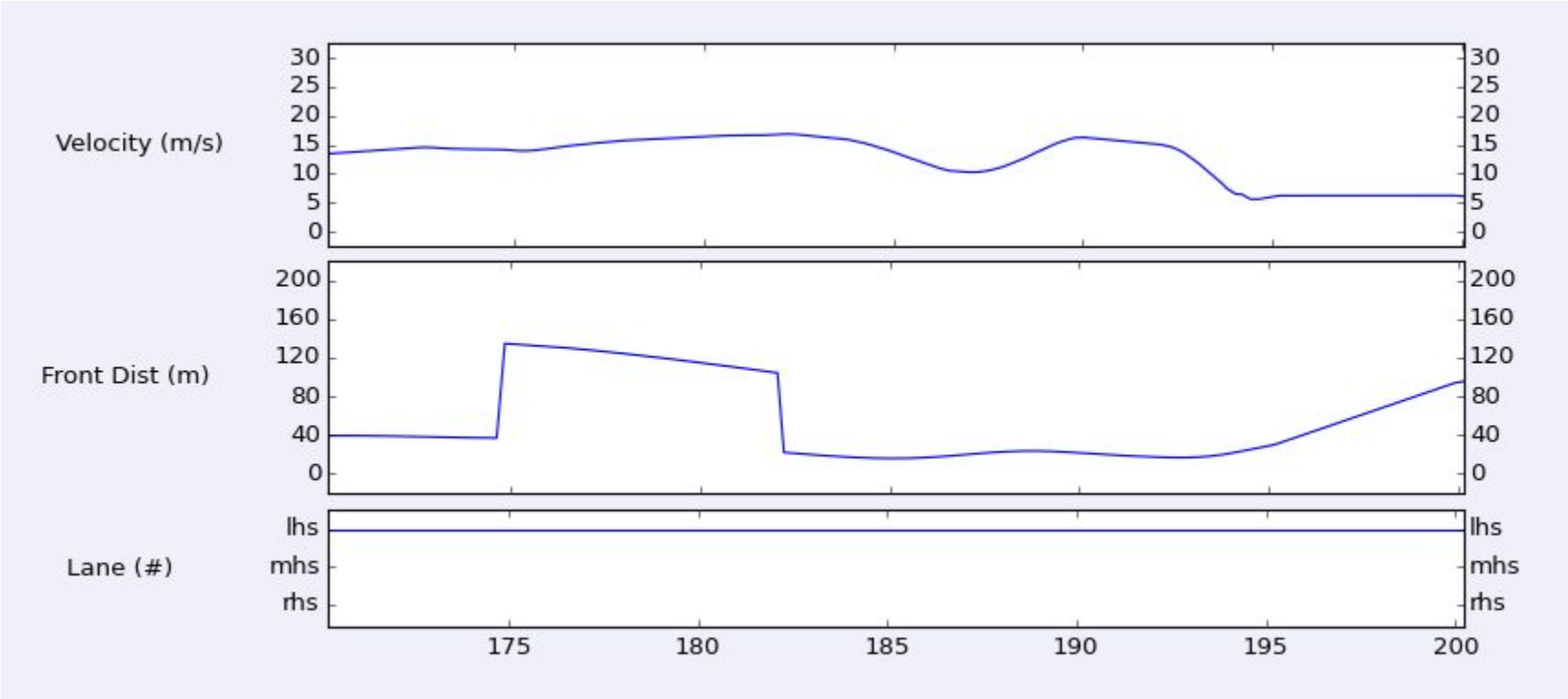
Goal and Motivation

- Goal
  - Identify and present drivers' aggressive behaviors, and predict future potential dangerous events
- Motivation
  - Safer driving: drivers can dynamically analyze their surroundings and detect potential dangers
  - Behavior analysis: insurance companies and driving schools can easily analyze the profile of their clients

Problem Formulation

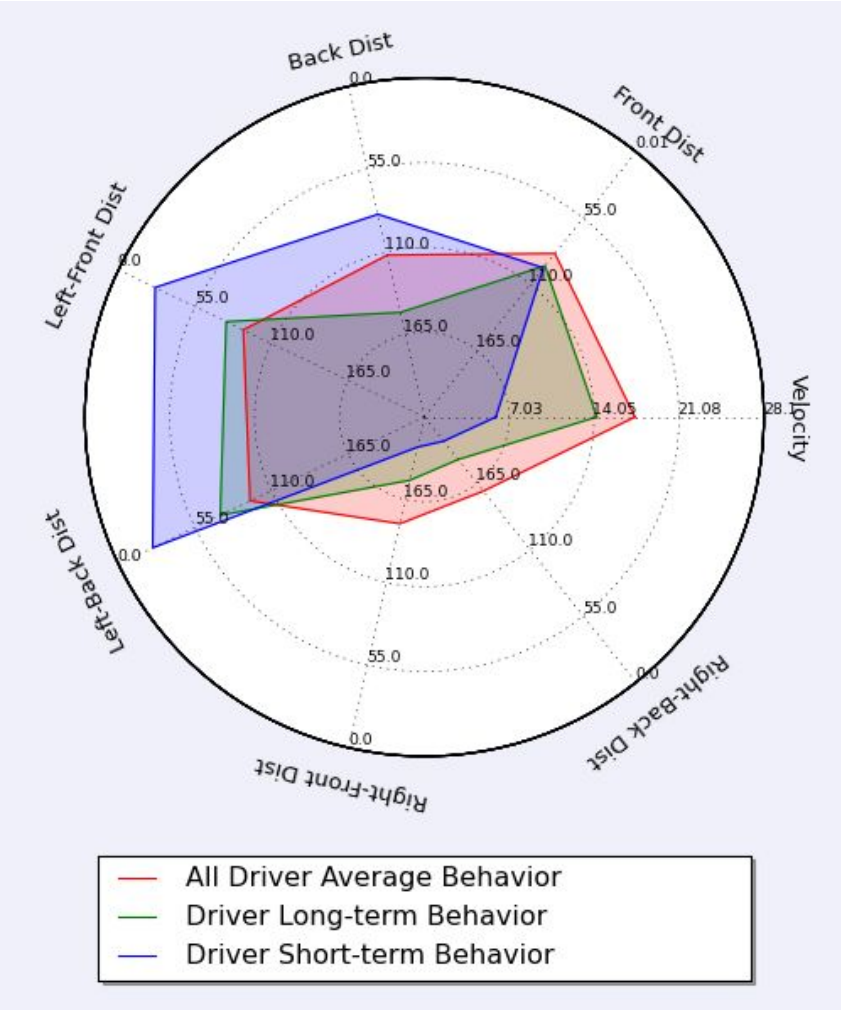
- Data
  - We define complex, aggressive related features from raw data collected with a driving simulator
- Models
  - Clearly present the drivers' aggressive profiles
  - Use long-term and short-term information to predict near future events

User Behavior: User Variation



Statistics of instant **driving behavior**.

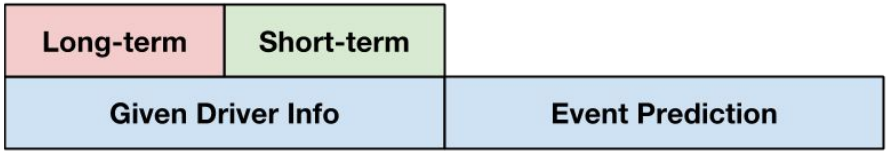
User Behavior: User Profile



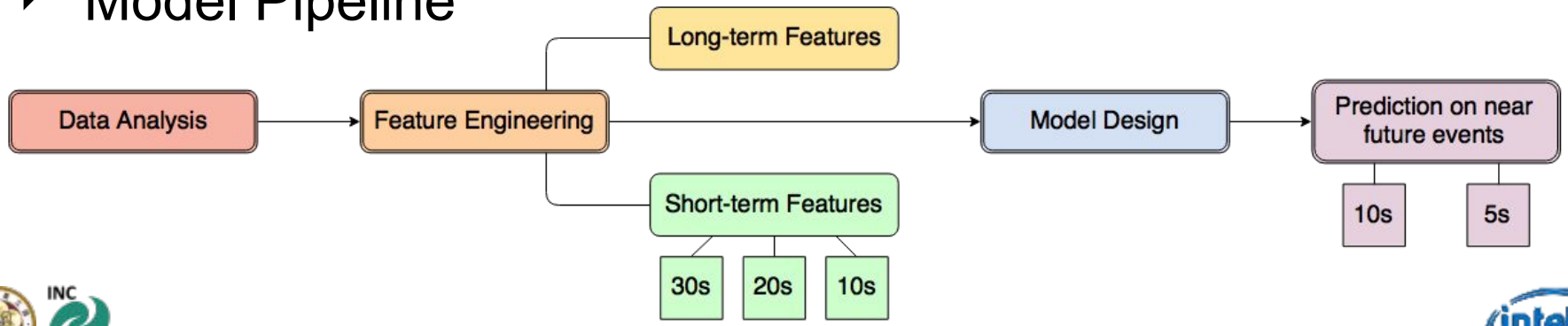
Seven labels to indicate driver's driving **aggressiveness**.

Event Predict: Experiment Design

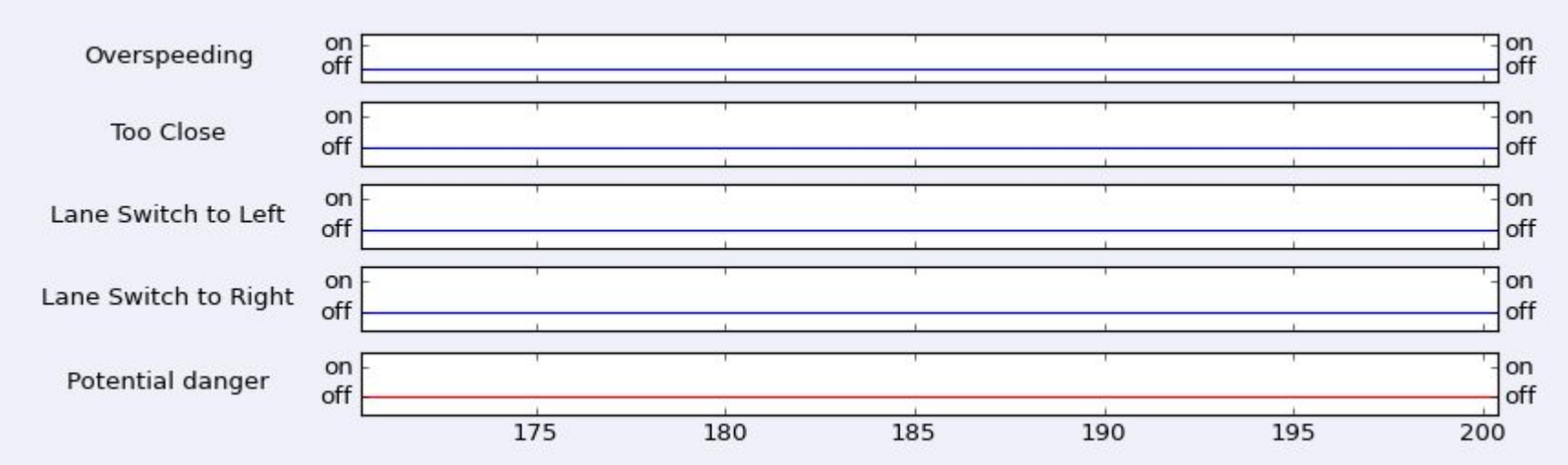
- Features
  - relevant features from long-term model, and adapted for short-term info



- Events Predicted
  - lane switch (to left / to right)
  - speeding
  - distance too close
- Model Pipeline

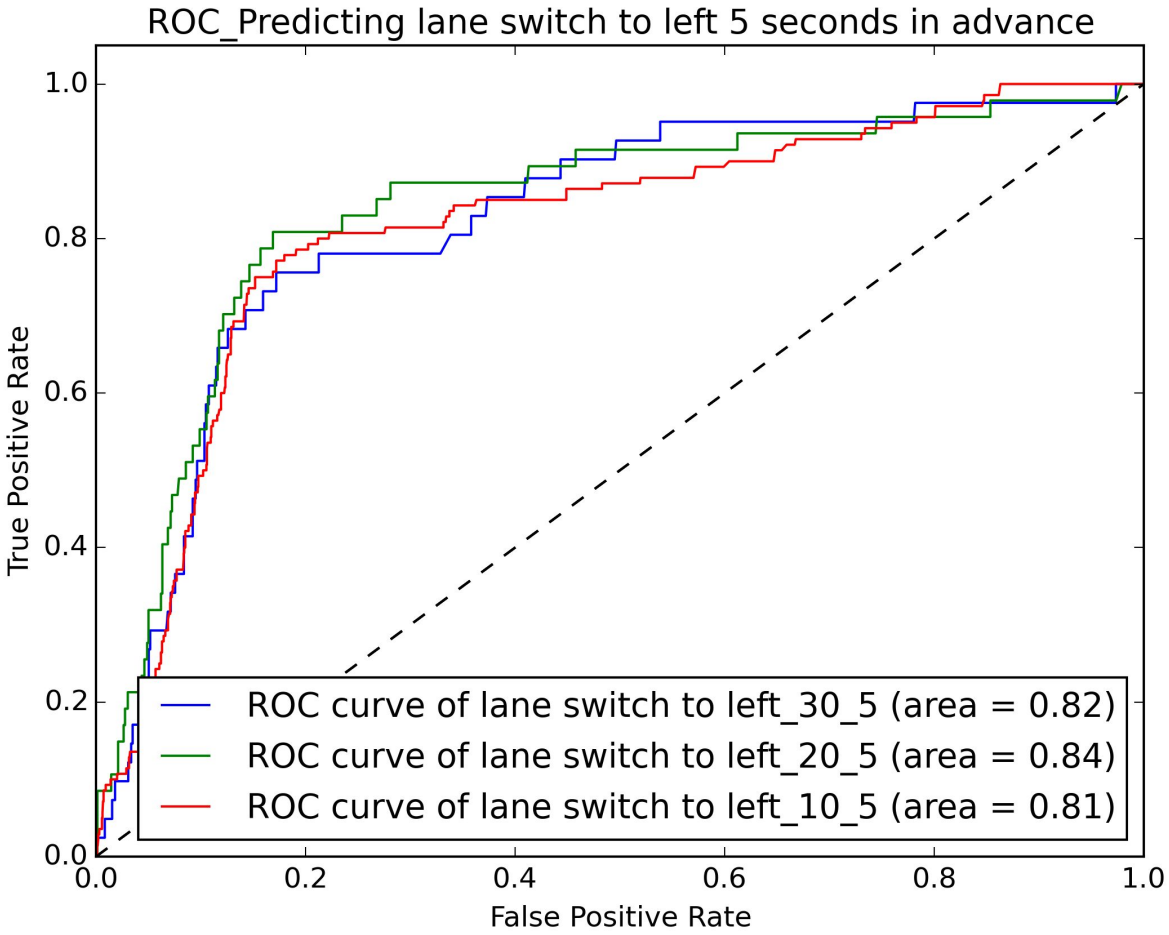


Event Predict: Real time Prediction



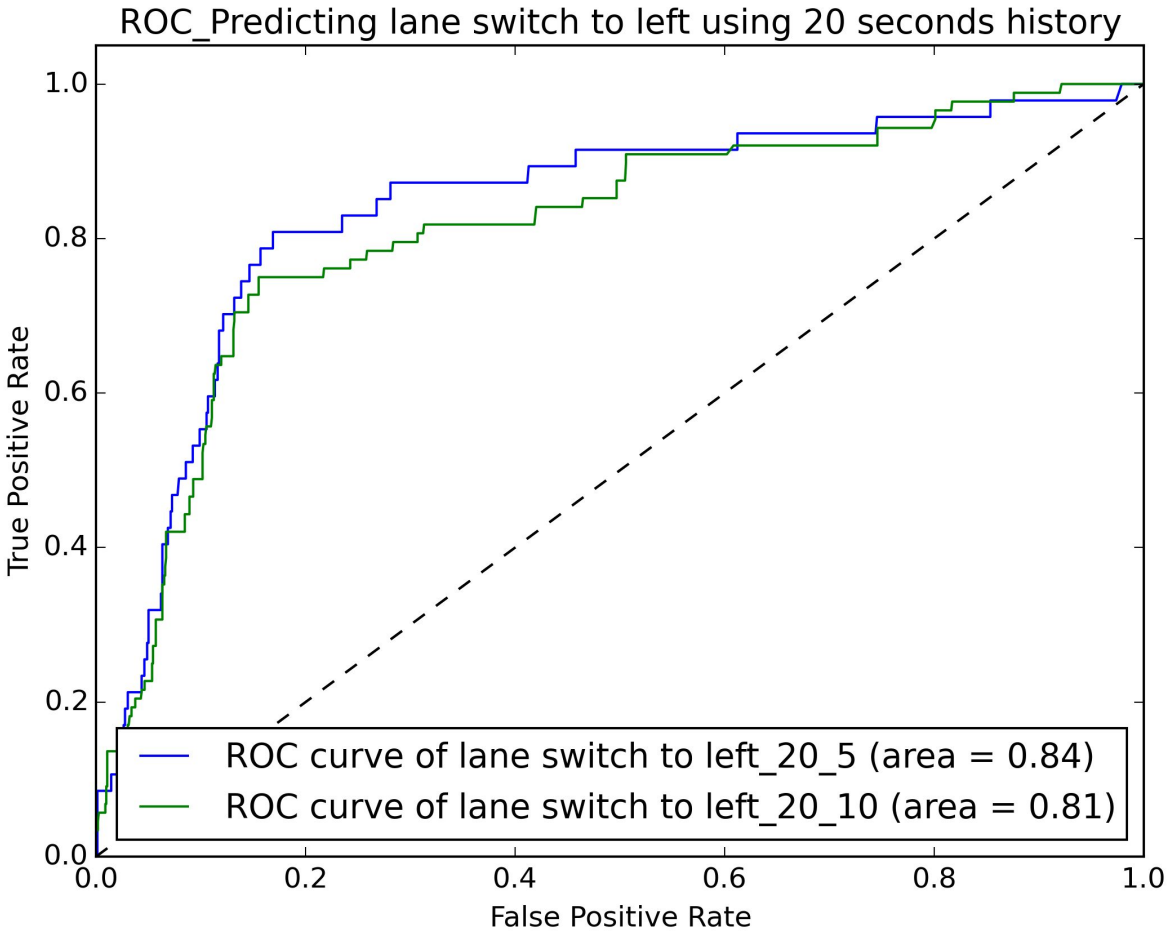
Four predicted indicator for **potential danger**, including *Overspeeding*, *Too Close*, *Lane Switch to Left* and *Lane Switch to Right*.

Event Predict: Experiment Result



Comparison between different **durations** of short-term features:
20 seconds history gives the best performance

Event Predict: Experiment Result



Comparison between different **time span** of predicted events:
10 seconds possible, but **5 seconds** history gives better performance