

Week 6

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The Intelligent Driver Model

$$\dot{v}_\alpha = a^{(\alpha)} \left[1 - \left(\frac{v_\alpha}{v_0^{(\alpha)}} \right)^\delta - \left(\frac{s^*(v_\alpha, \Delta v_\alpha)}{s_\alpha} \right)^2 \right].$$

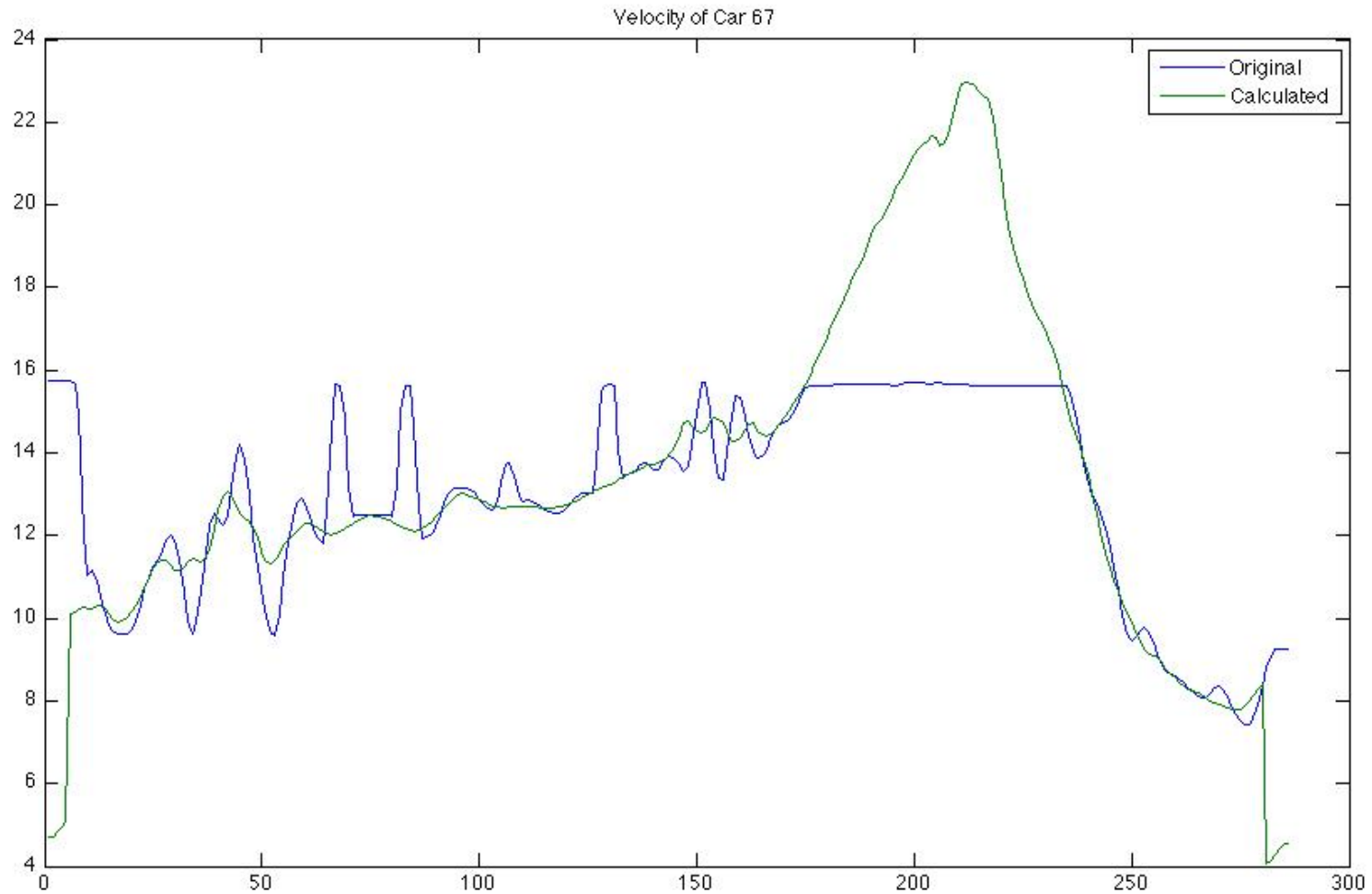
Identifying Aggressive or Unsafe Vehicle Behaviors

- Acceleration Behaviors
 - Accelerating too quickly
 - Braking too sharply
 - Not braking when should be braking
- Speeding
- Following too closely
- Lane Changes
 - Twice in rapid succession
 - Three lane changes in a short period of time

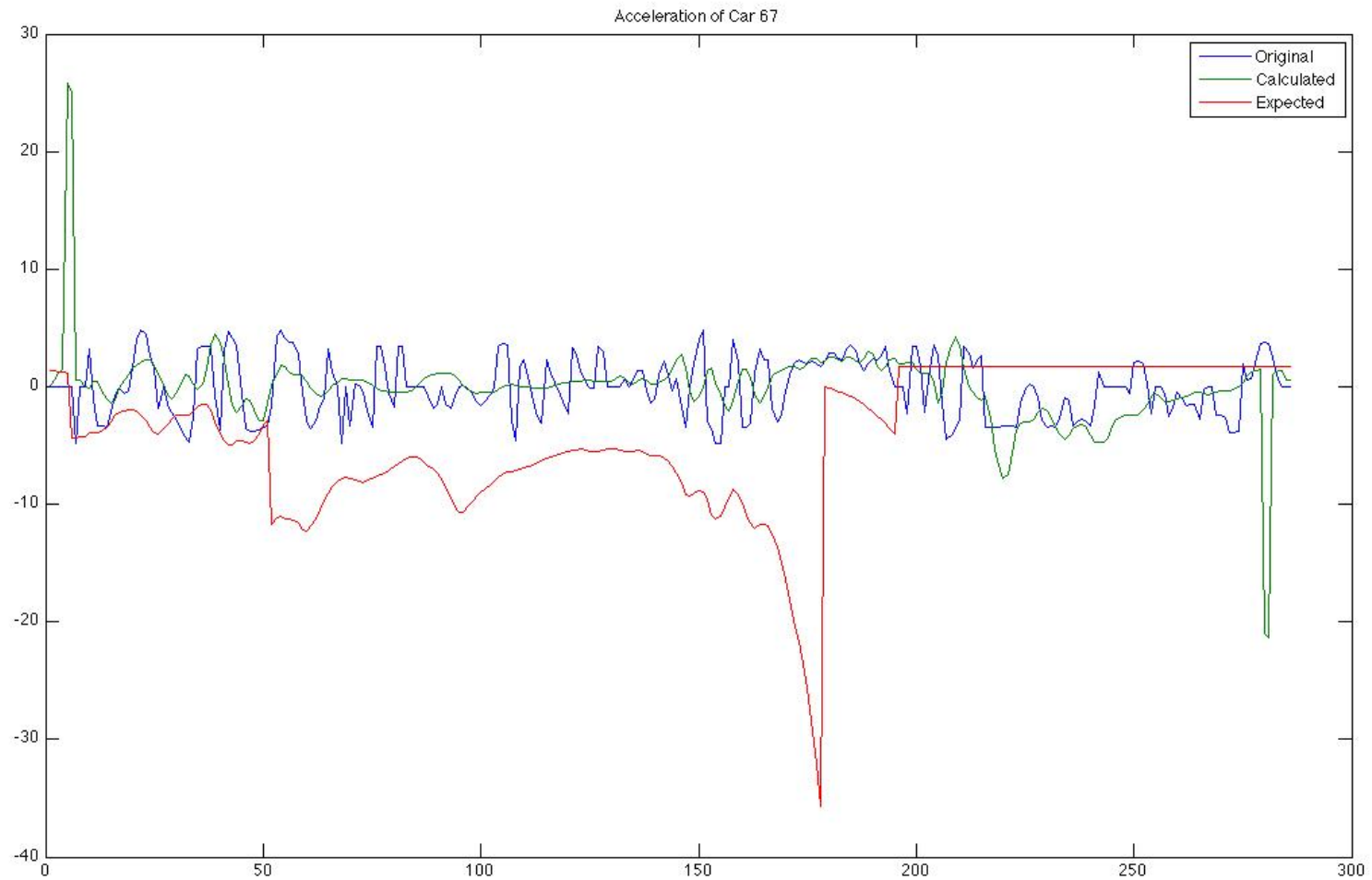
Issues

- Provided data from NGSIM has inaccuracies
 - Velocity and acceleration values are sometimes wrong
- Position data is also jittery rather than smooth
 - To compensate, we average the position over 1 second
 - This helps to reduce excessive spontaneous accelerations

Velocity of Car 67

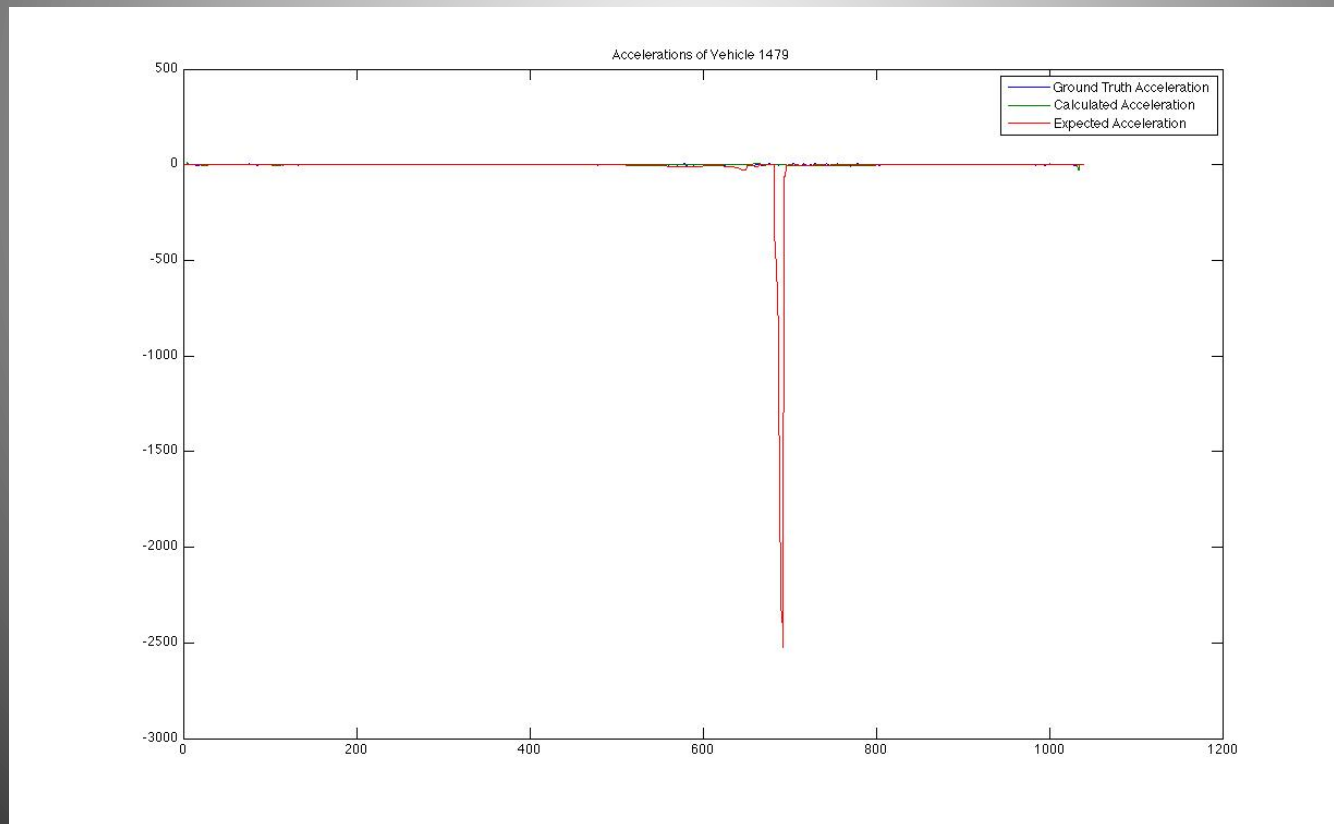


Acceleration of Car 67

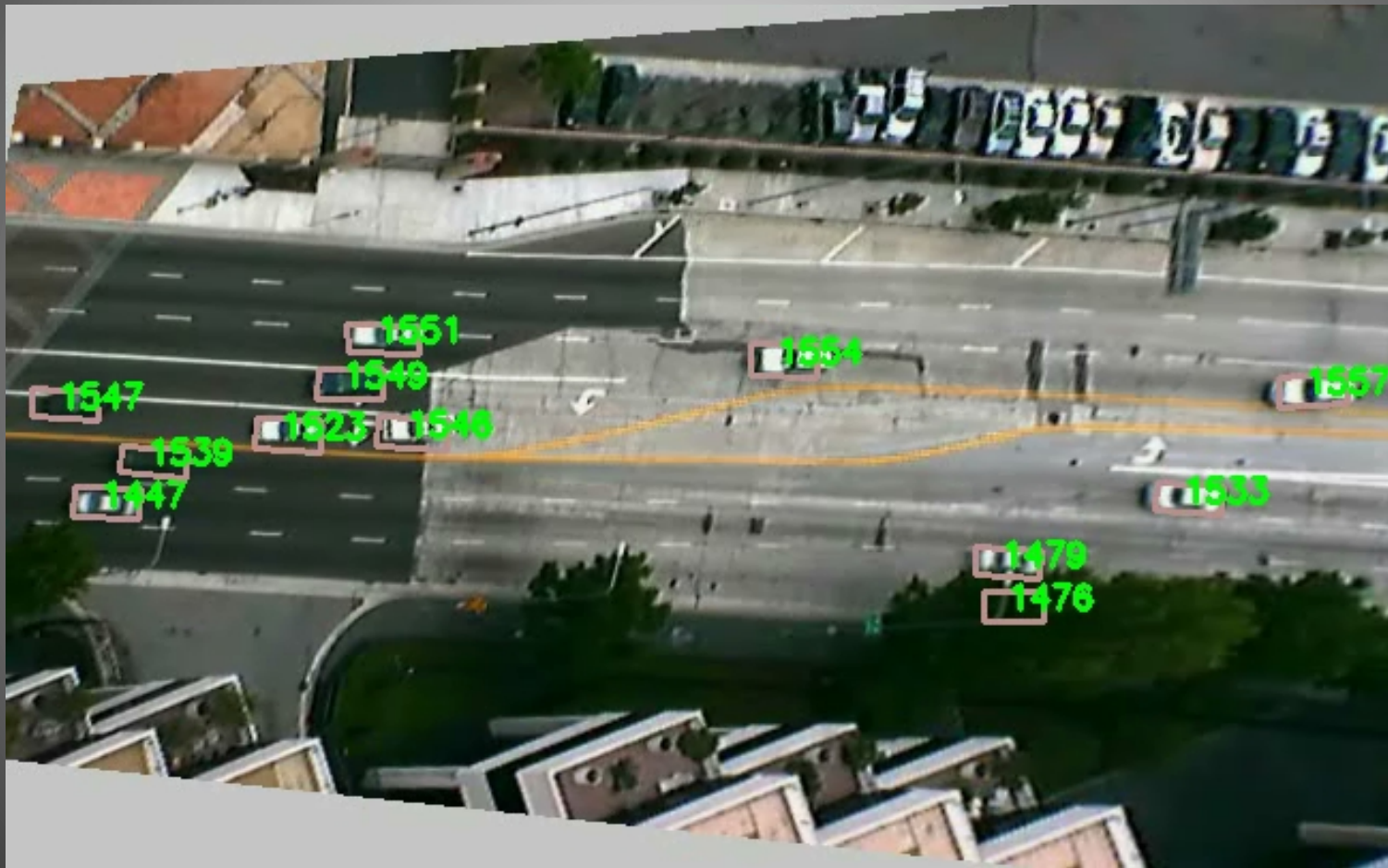


Red is Expected Acceleration (car 1479)

- According to the IDM, this car should be braking at over 2500 m/s^2



Here is what is happening...



Current Plans

- The model parameters are for real-world coordinates (position (m), following distance (m), velocity (m/s))
- We would like to use a learning period to determine appropriate values for these parameters
- If successful, this may be used to create parameters in terms of image coordinates (pixels)