

# Automatic Detection, Classification and Analysis of Traffic Conflicts From Trajectory Data

## Bachelor's Thesis of Somakala Subbaraman

### Mentoring:

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### Motivation:

Social Force Models are increasingly used in pedestrian simulations. In its simplest implementation, the interaction force in the social force model uses only geometric information such as the distance vector to other agents and bearing angle. Improved versions of the model have been proposed, that use other parameters, such as Time to Interaction (TTI) or Time to Closest Approach (TCA) to calculate these forces.

This thesis aims to analyze the interactions between pedestrians and their surroundings using naturalistic trajectory data and evaluate the relevance of commonly used parameters, such as TTI and TCA, to describe these interactions.

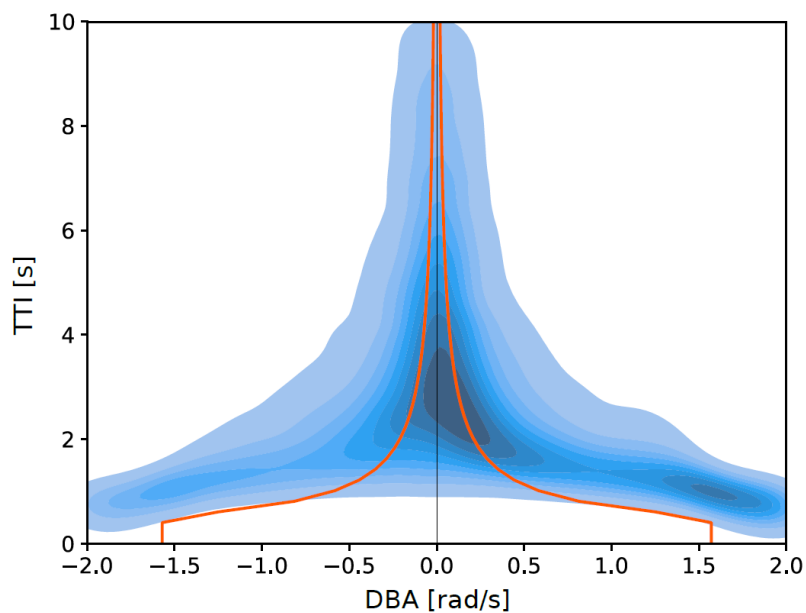


Figure 2: TTI against DBA, with threshold function  $\tau_1(tti)$  in orange

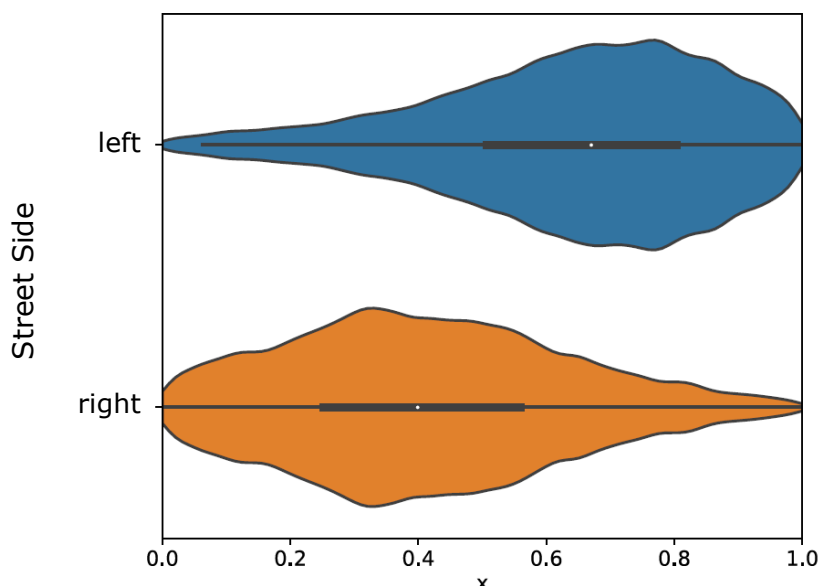


Figure 3: Distribution of x for different street sides

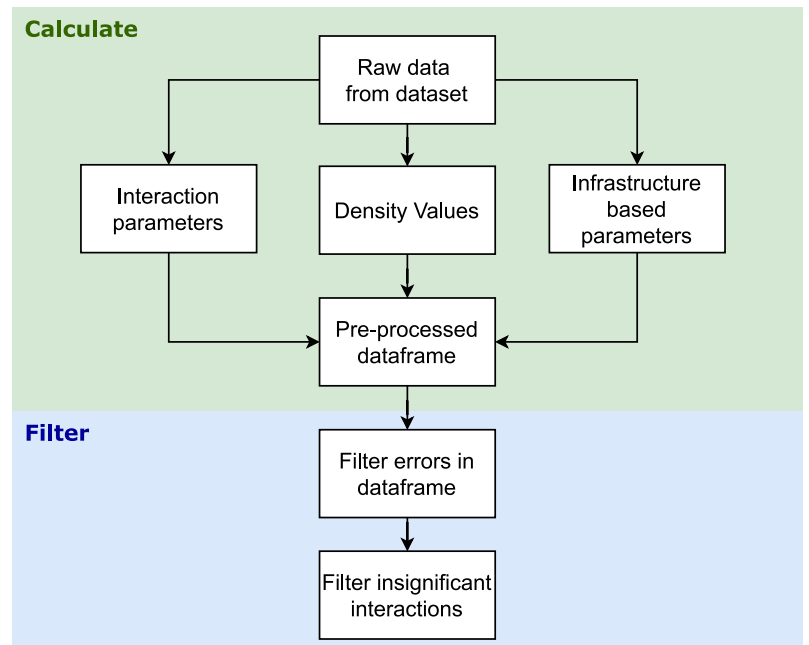


Figure 1: Data Processing

### Results and Discussion:

- The shape of the threshold function  $\tau_1(tti)$  proposed by Ondrej is reflected in trajectory data (see Figure 2). The fitting parameters must be calibrated to the dataset in order to achieve a better fit.
- Pedestrians tend to stay on the right side of the sidewalk. This behavior is more strongly observed when an interaction is imminent. The width of the sidewalk and the side on which the road is on also have a significant influence on this behavior (see Figure 3).
- At higher densities, interaction parameters tend to be more critical, and the average velocity is lower. Datasets with higher pedestrian density are needed to observe a clearer trend.

### Limitations of interaction parameters:

- When pedestrians are very close, collisions can occur even if DBA is fairly high. As a result, the absolute value of DBA alone without TTI, does not provide much information about the interaction.
- No clear trend was observed between interaction parameters and the motor response of pedestrians.

### Future Work:

- Other factors such as the pedestrian's goal or group dynamics can be considered.
- The threshold function can be fitted to various subsets of data for a quantitative analysis of the fitting parameter.