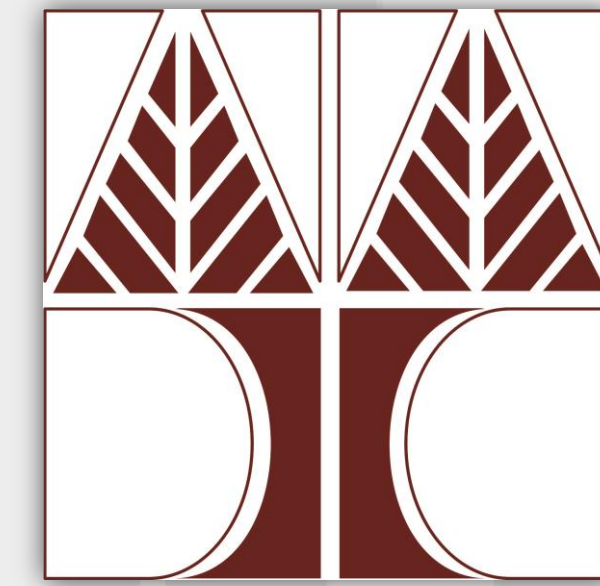




# Classifying Pedestrian Behaviour Using Random Forests

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## INTRODUCTION

**Target:** Extract a high level understanding of real or synthetic pedestrian trajectories.

**Motivation:**

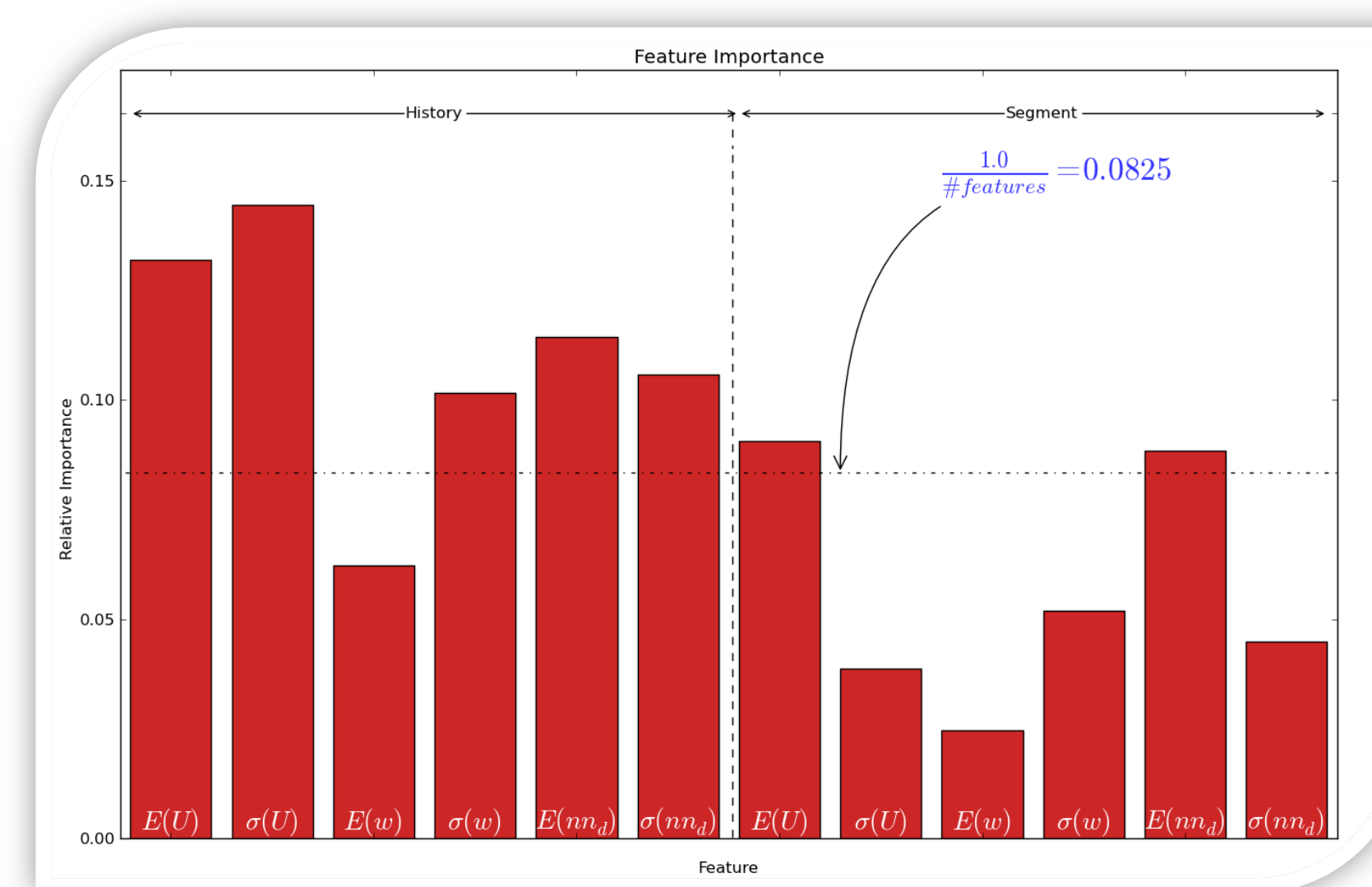
- Better **evaluation** of crowd simulations
- **Outlier detection** for abnormal behaviours
- Motion **mining** for crowd synthesis and editing

**Concept:** Trajectory segments are classified using local and global statistical descriptors.

- **Global Descriptors** describe higher level capture of people such as groups
- **Local Descriptors** capture subtle changes in the pedestrians behaviour such as stopping to talk for a few seconds or changes in speed due to interactions.

## DESCRIPTOR IMPORTANCE

**Feature Importance:** Most of them contribute to the classification with the most important being global knowledge of speed and neighborhood for both the global and local cases.



## PREPROCESSING

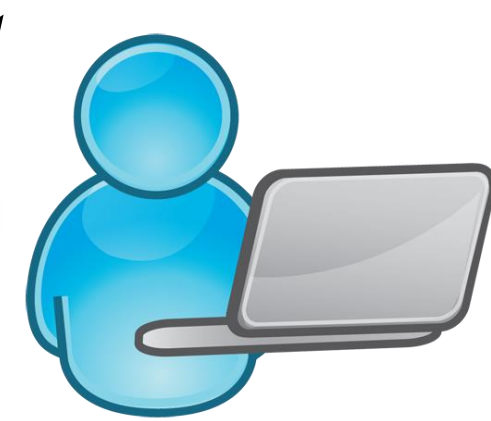


Manual Annotation

- : Walk      C: Wait
- A: Wander    D: Meet and Talk
- B: Walk Fast   E: Group



Trajectories are tagged and categorized in 6 classes, some of which are very similar.



## CLASSIFICATION

Statistics Gathering



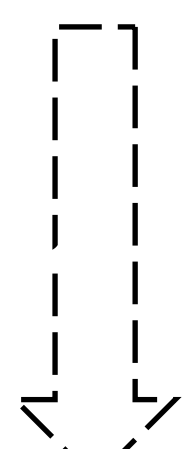
	Statistic	$E(\cdot)$	$\sigma(\cdot)$	Description
History	$U(t)$	✓	✓	Speed
	$w(t)$	✓	✓	Rotational Speed
	$nn_d(t)$	✓	✓	Distance to nearest neighbor
Segment	$U(t)$	✓	✓	Speed
	$w(t)$	✓	✓	Rotational Speed
	$nn_{dist}(t)$	✓	✓	Distance to nearest neighbor

New crowd datasets (videos and simulations) are tracked and statistics are gathered as in the preprocessing phase.

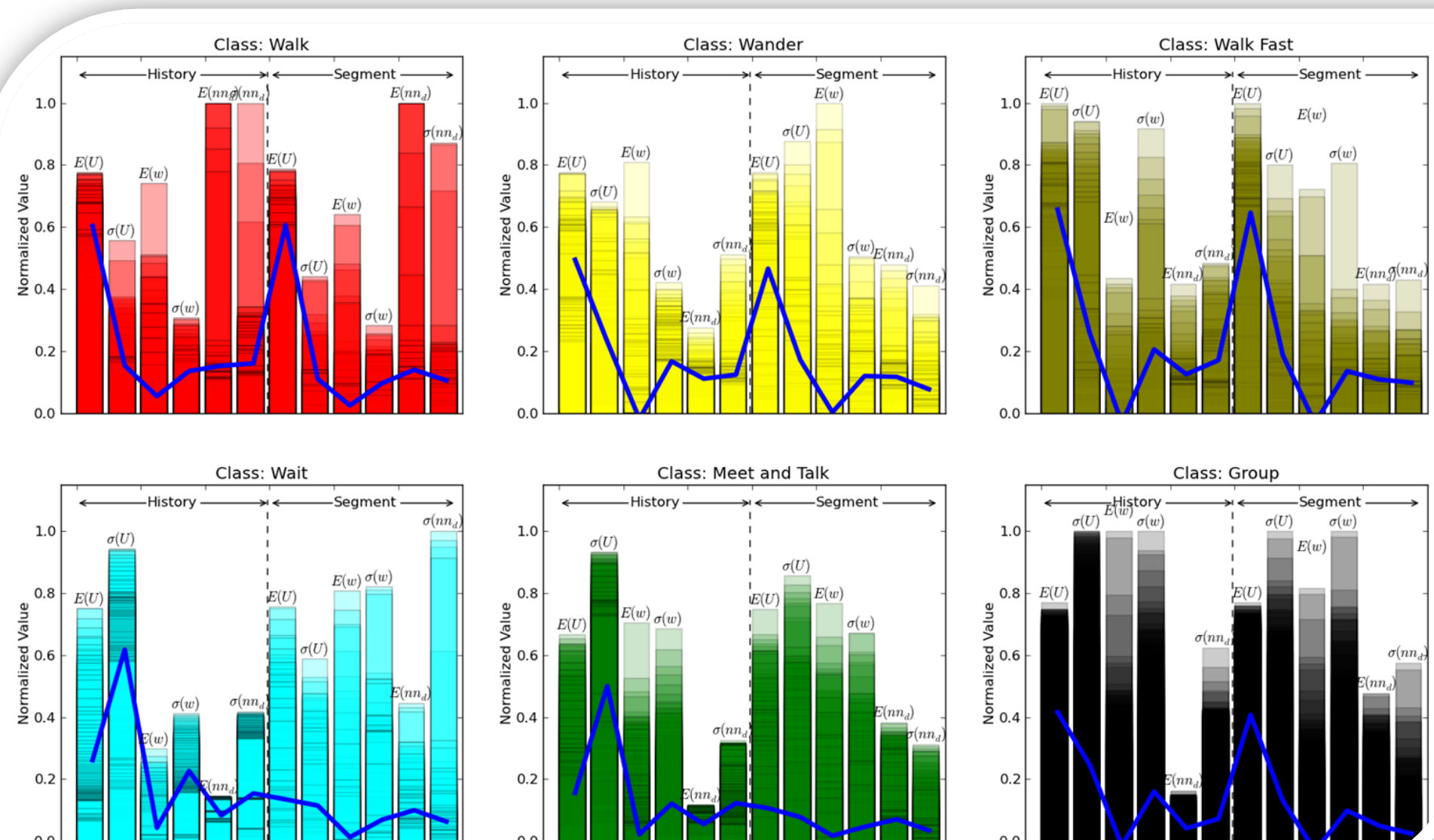
Statistics Gathering

	Statistic	$E(\cdot)$	$\sigma(\cdot)$	Description
History	$U(t)$	✓	✓	Speed
	$w(t)$	✓	✓	Rotational Speed
	$nn_d(t)$	✓	✓	Distance to nearest neighbor
Segment	$U(t)$	✓	✓	Speed
	$w(t)$	✓	✓	Rotational Speed
	$nn_{dist}(t)$	✓	✓	Distance to nearest neighbor

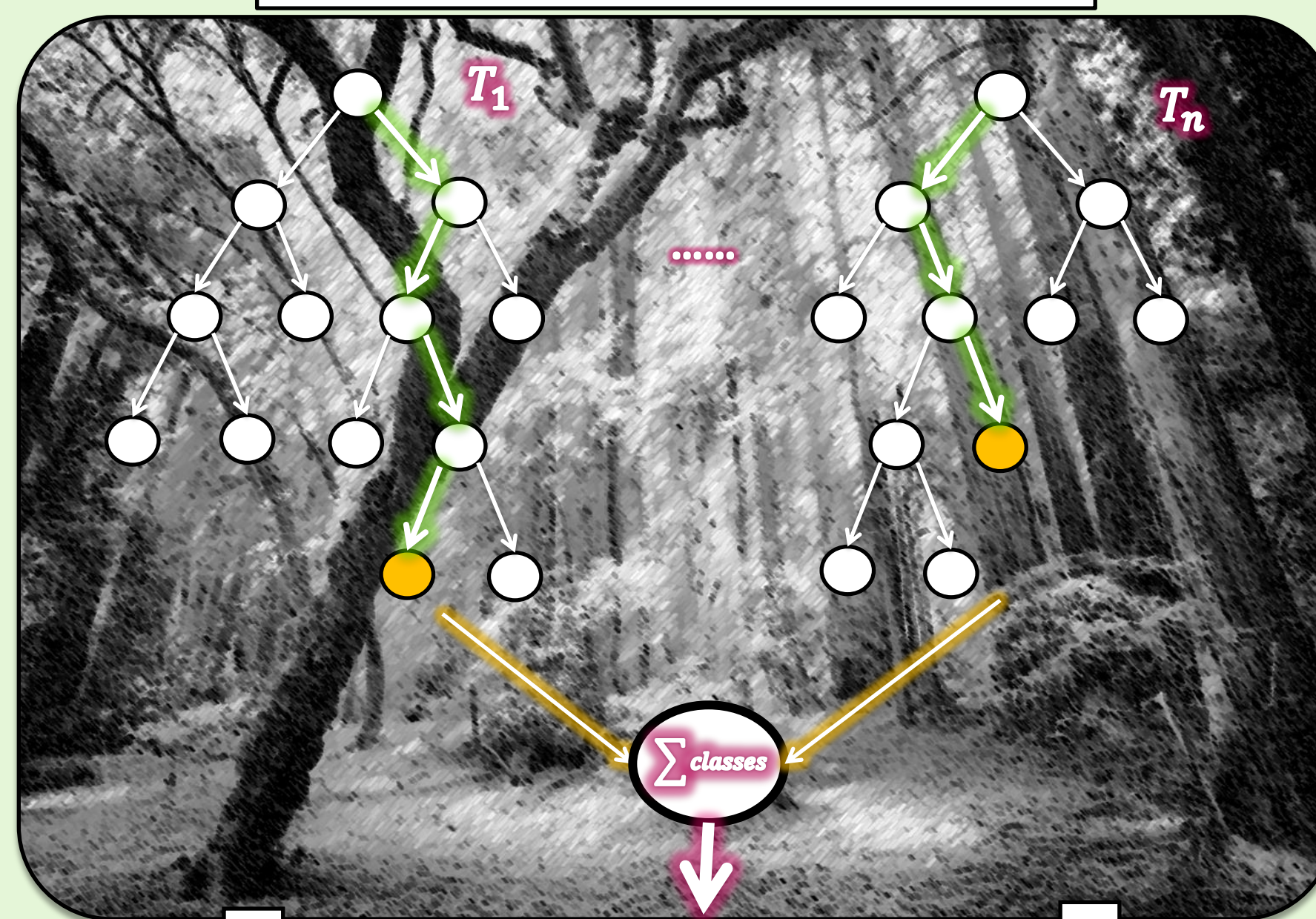
12 Statistics/Descriptors are calculated and correlated for short trajectory segments.



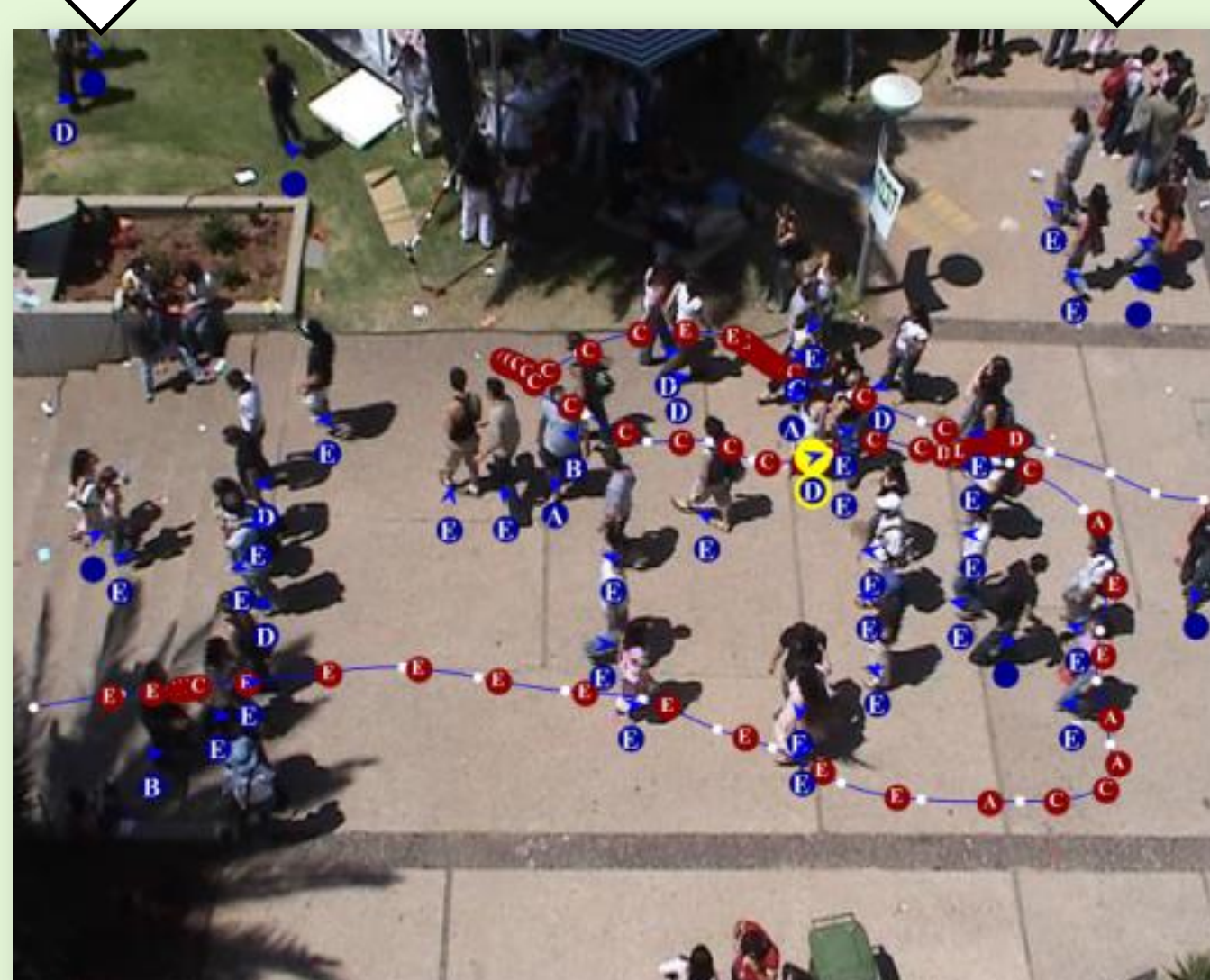
Clusters have subtle differences



## Random Forrest Classifier



Automatic Annotation



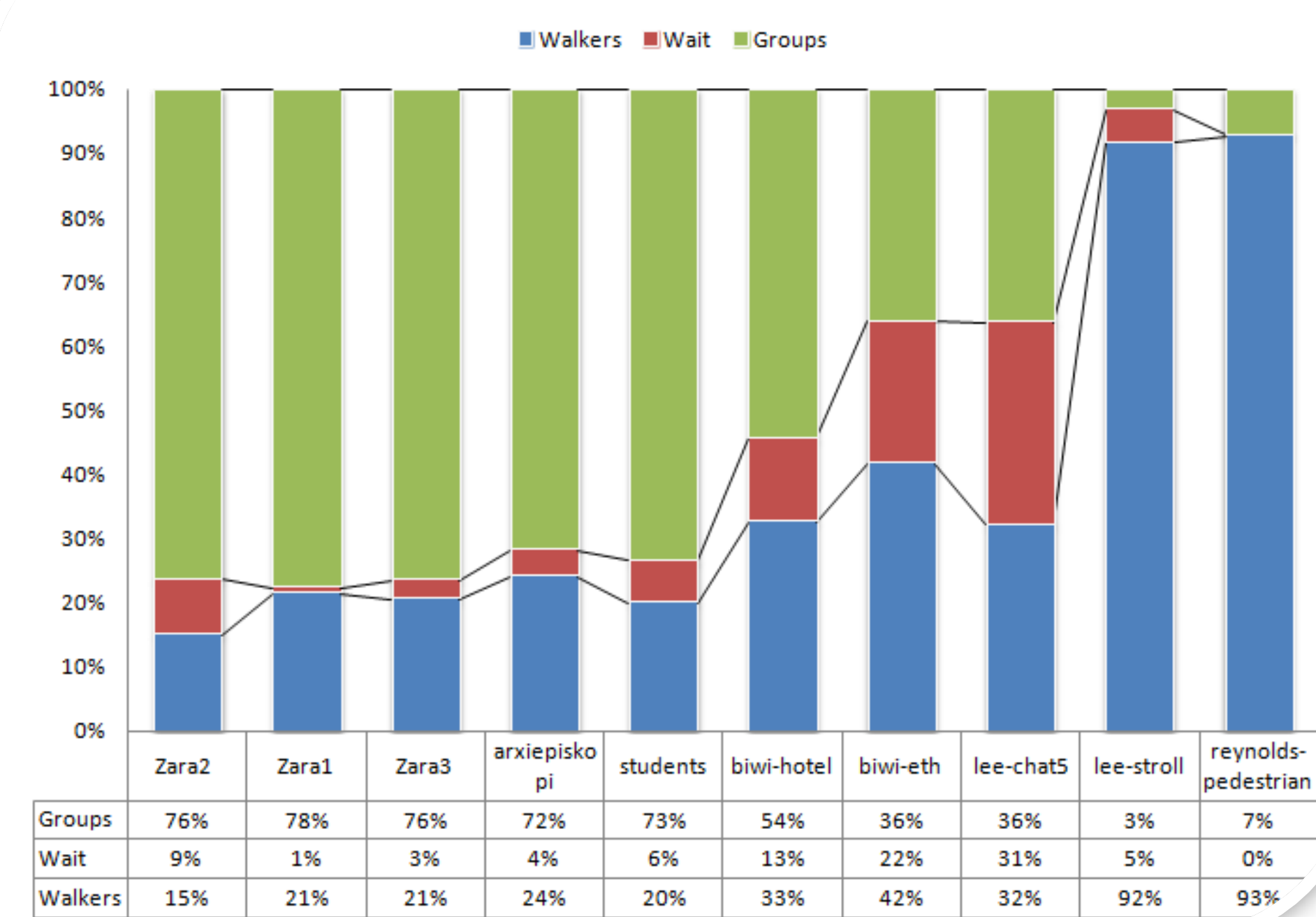
Automatically Annotated Trajectory segments.

Classification

**Example Study:** Using as input a video of a real crowd (Zara2), a series of other datasets were classified.

Early results indicate good classification accuracy. More thorough experiments are currently being conducted.

## Classes



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