

Globally Continuous and Non-Markovian Crowd Activity Analysis from Videos

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967 trajectories

Motivation

- Challenges
 - On what level of abstraction
 - Global (density)? Too general
 - Local (trajectories)? Too specific
 - Flows: right granularity
 - Flows
 - The number of flows
 - Relative prominence of flows
 - Temporal change of flows

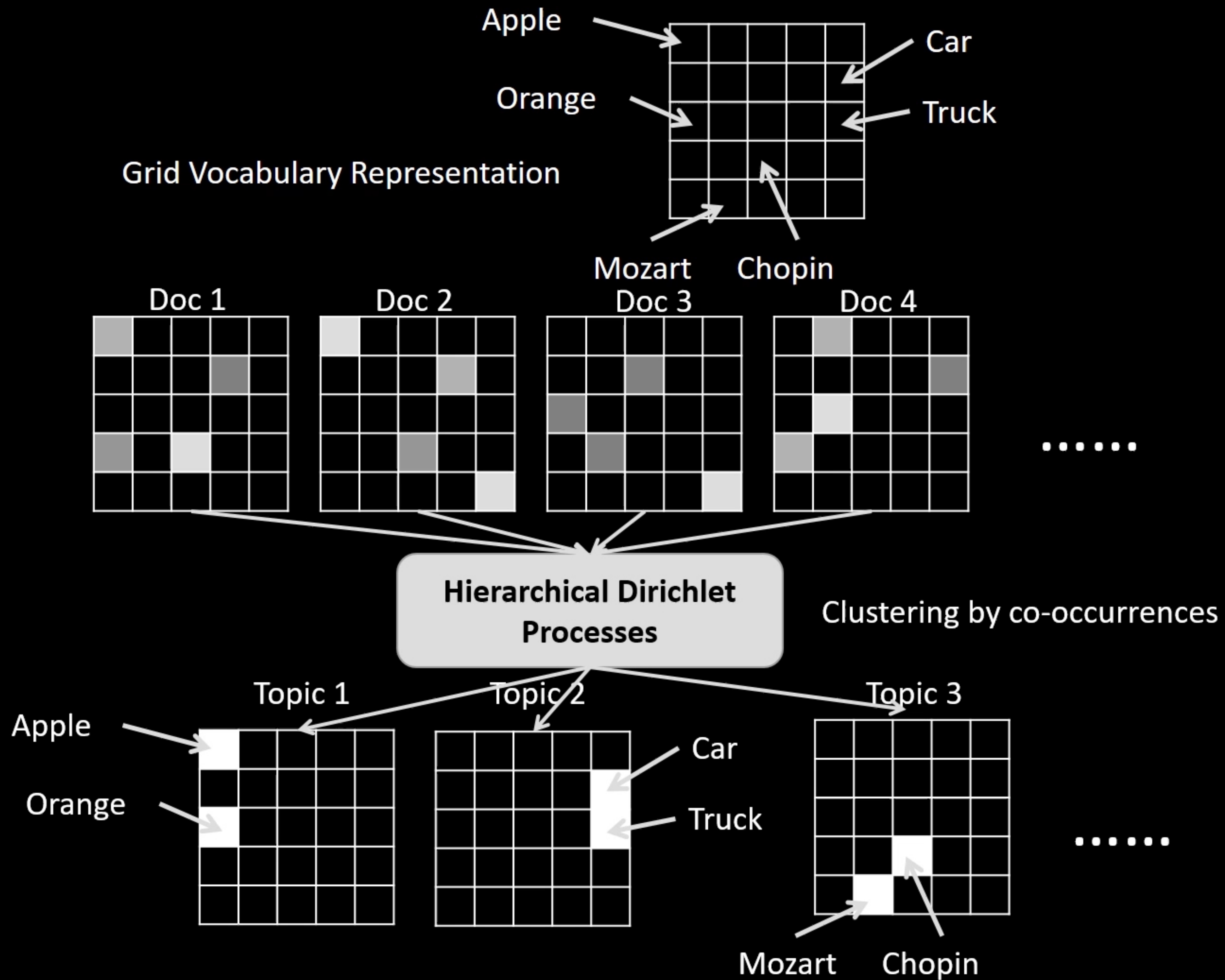


Introduction

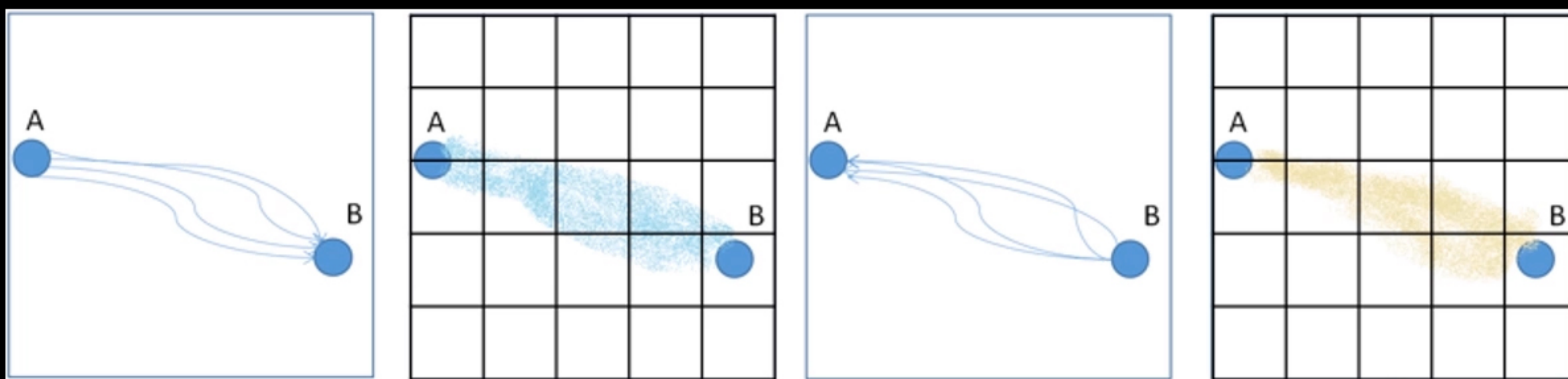
- Clustering Trajectories (time-series) to compute flows
 - A Spatio-temporal Hierarchical Dirichlet Processes (STHDP) model
 - Automatically decides the number of flows and cluster trajectories into flows
 - Meanwhile fits a Gaussian Mixture Model on the temporal info of each flow
 - Fits data better
 - More aligned with human judgments
 - Better to detect temporal anomaly

Related Work

- Also known as Topic Models
 - Mining topics out of text data
 - In vision, used in Object recognition, Segmentation, Crowd Analysis
- Previous topic models for crowd analysis
 - Only Spatial
 - Or discrete time (e.g. Markovian progression)
 - Or motifs, only locally continuous in time
- Globally continuous and non-Markovian flows



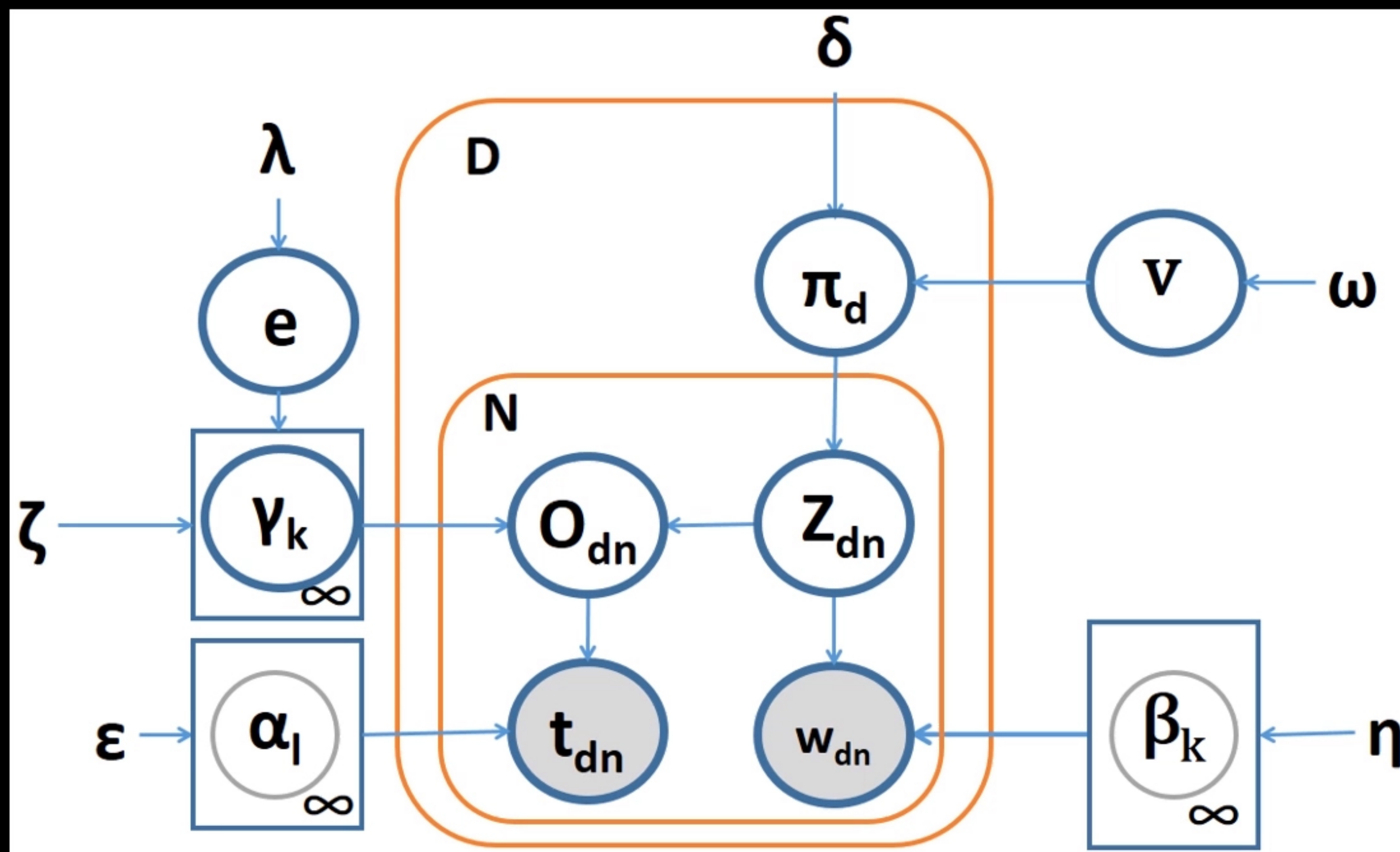
Methodology



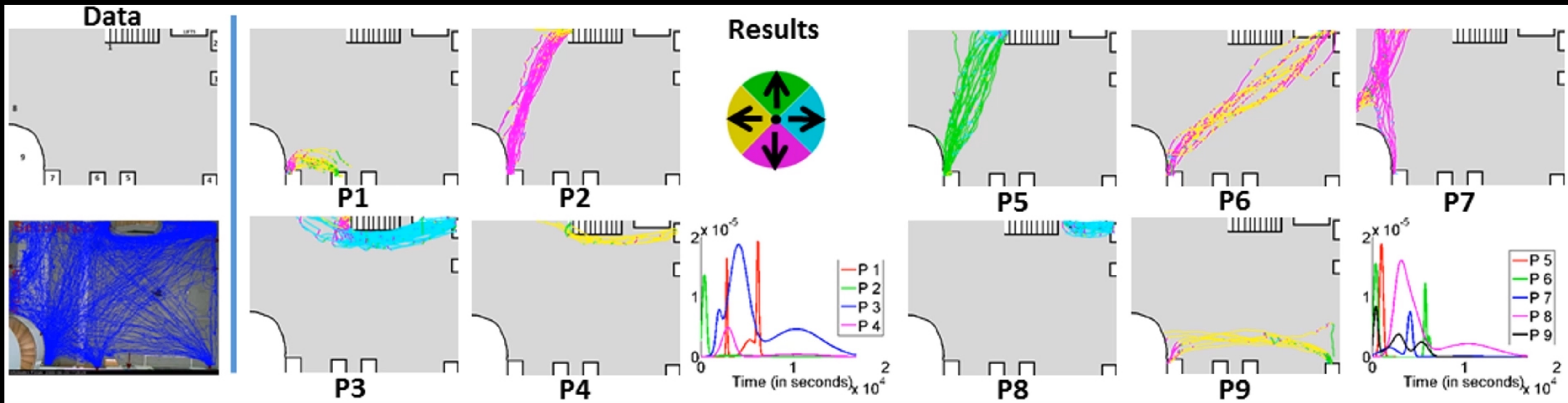
Observations on the same path will co-occur!

Multinomial

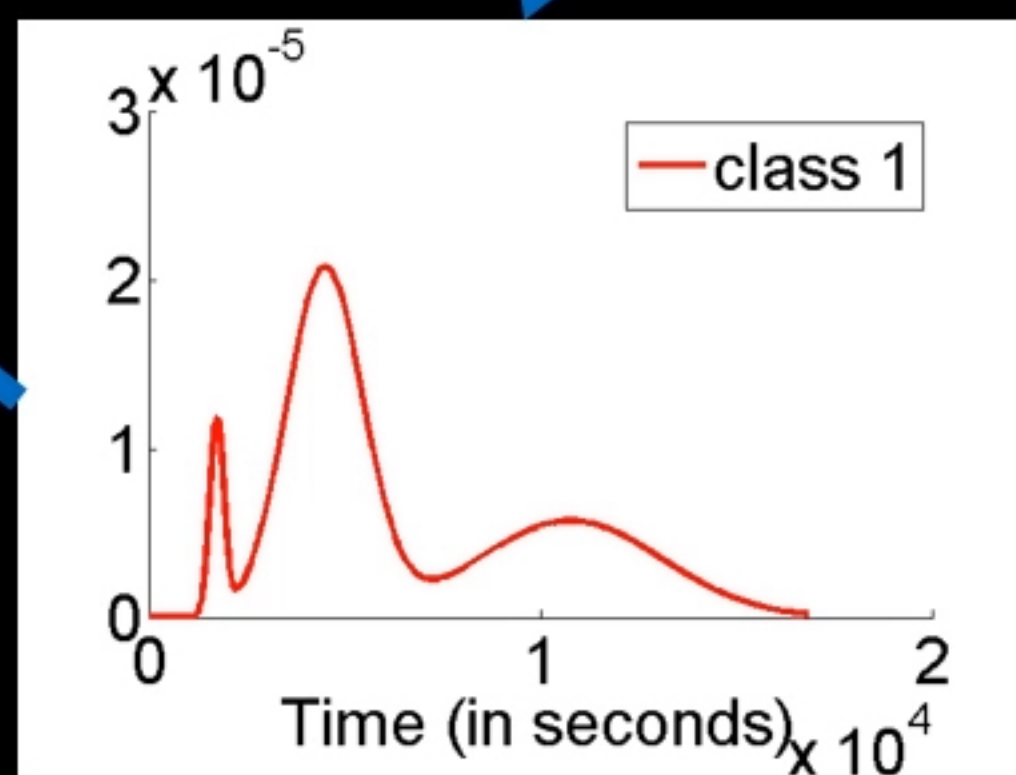
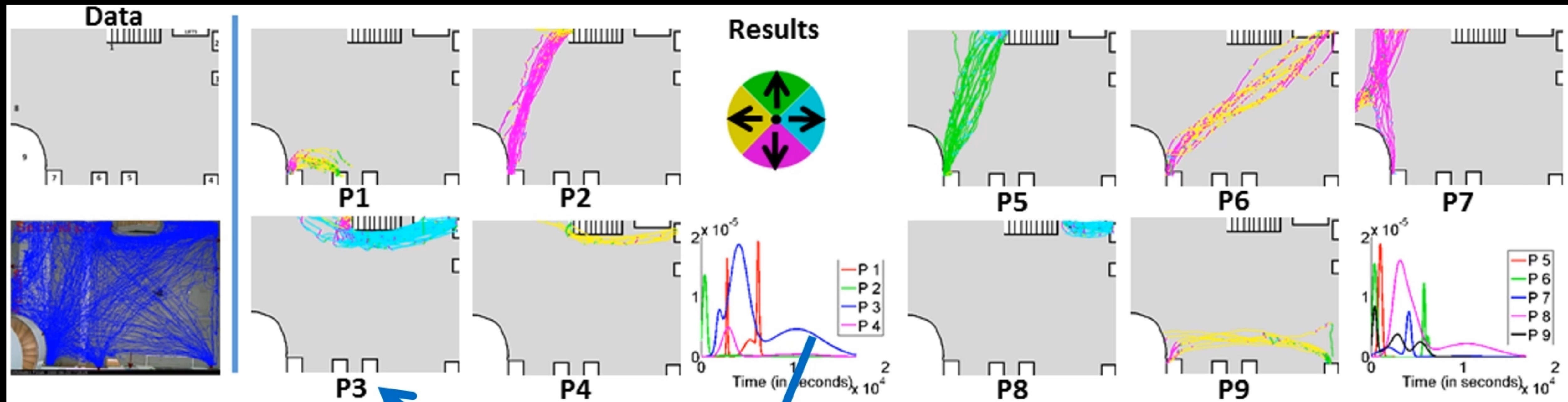
Methodology



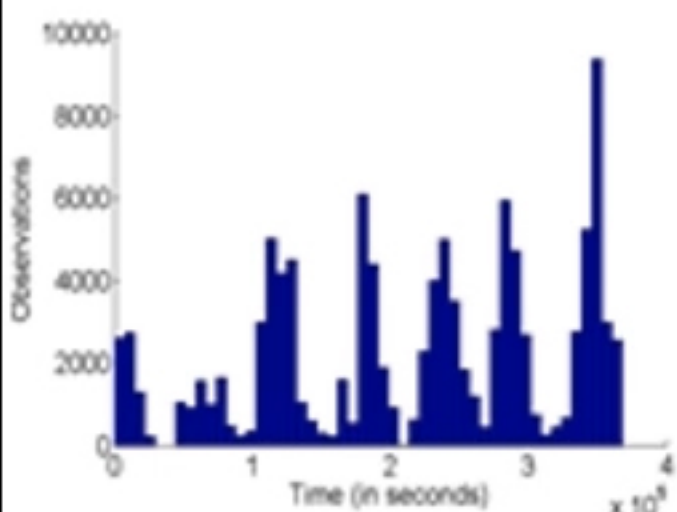
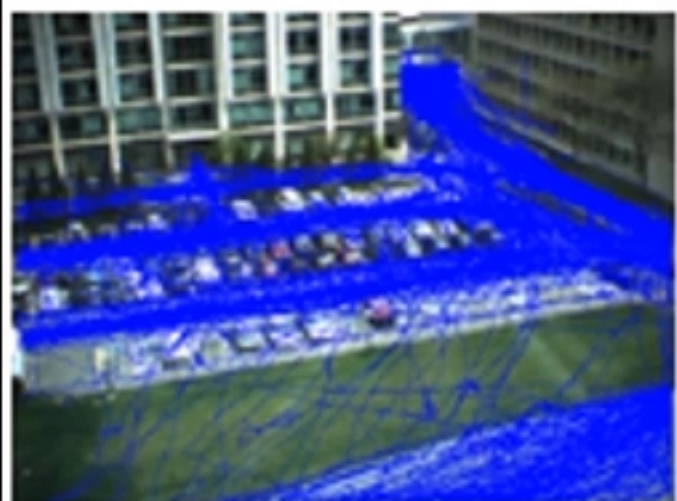
Results



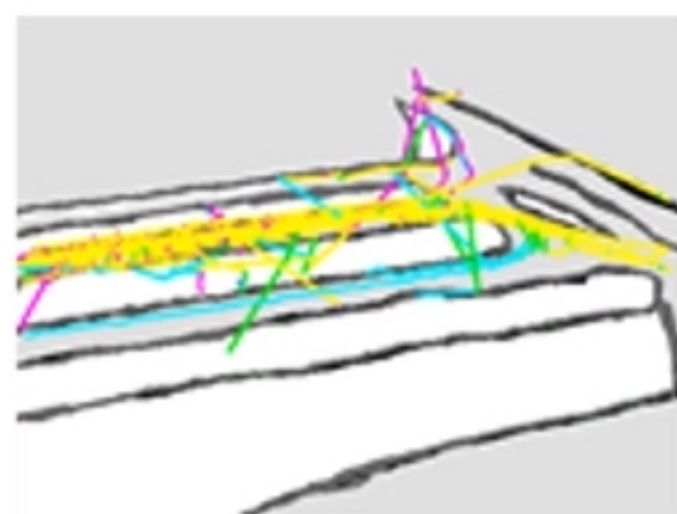
Results



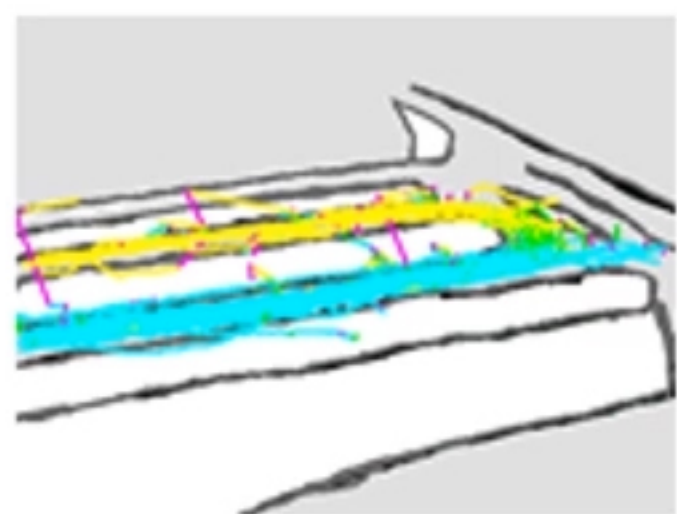
Data



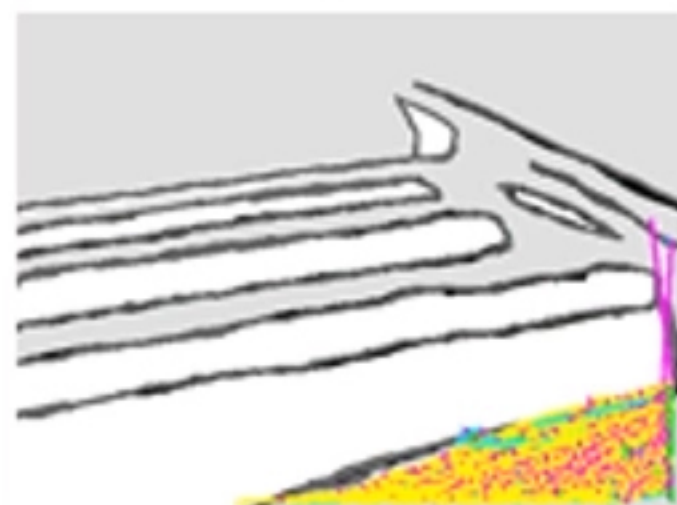
Results



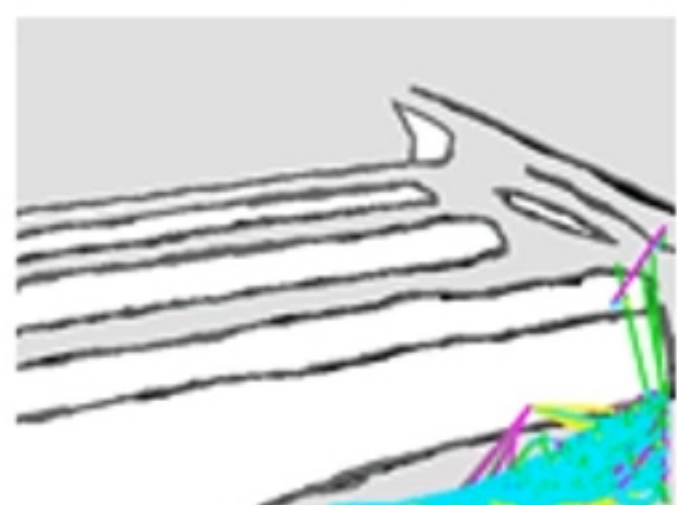
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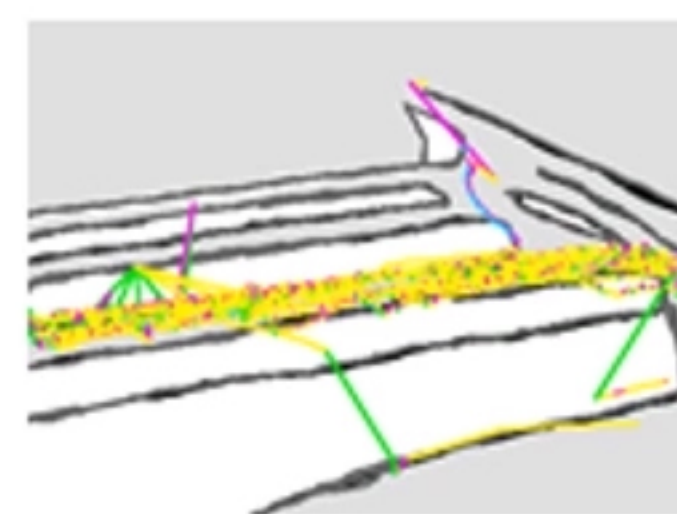
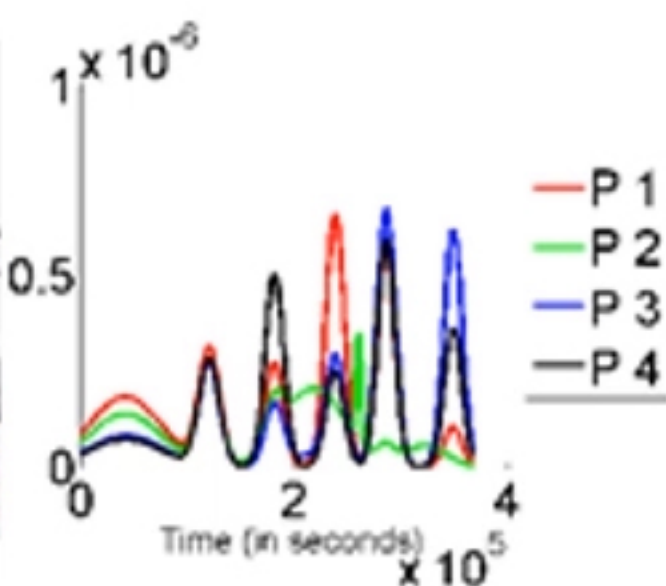
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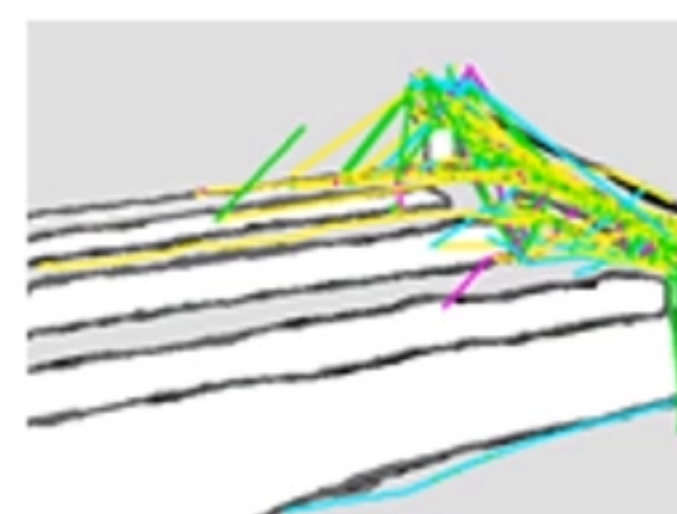
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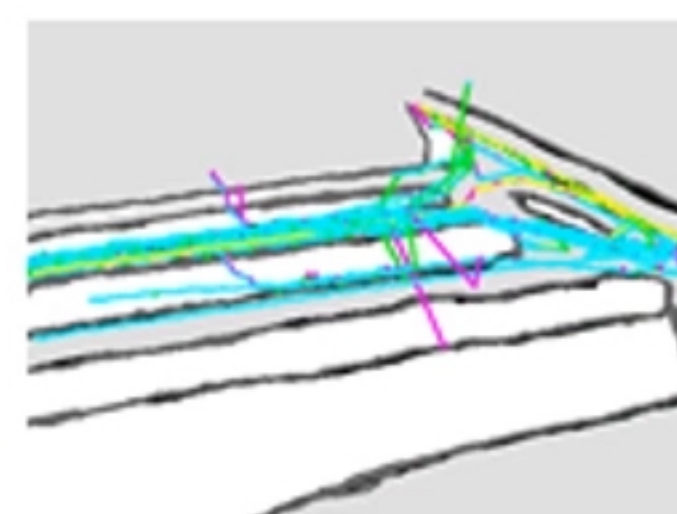
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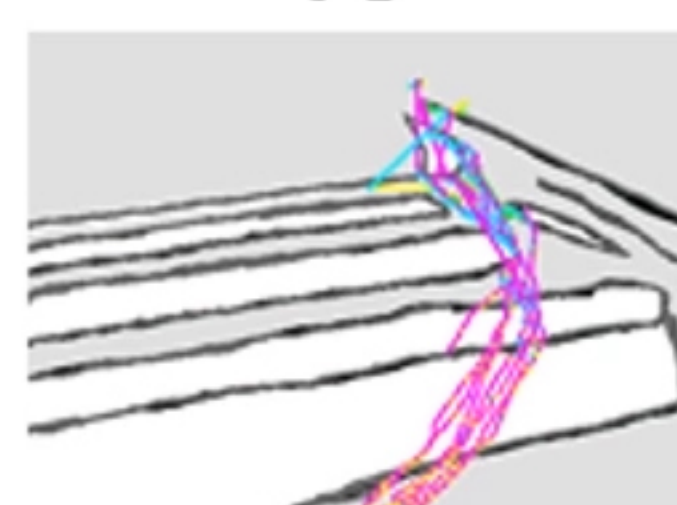
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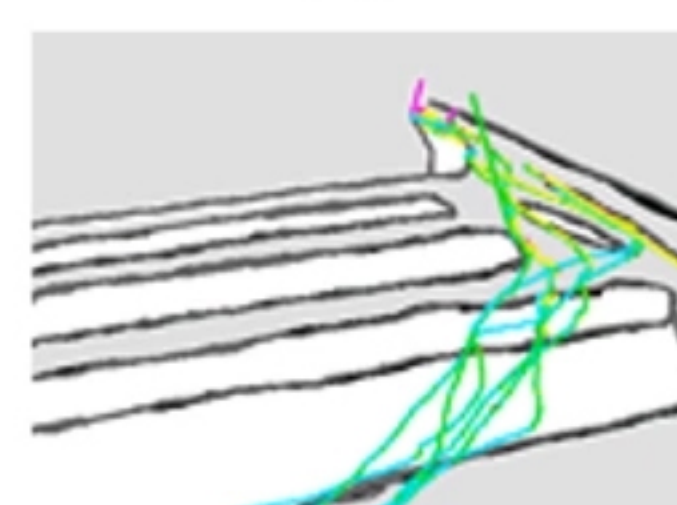
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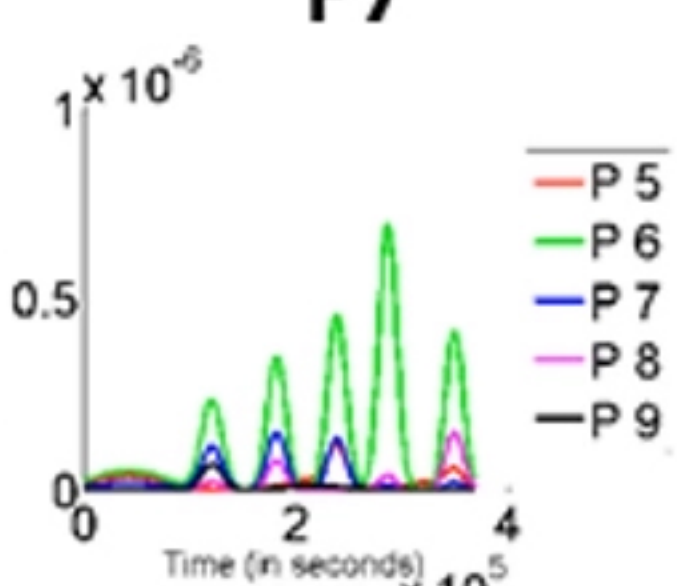
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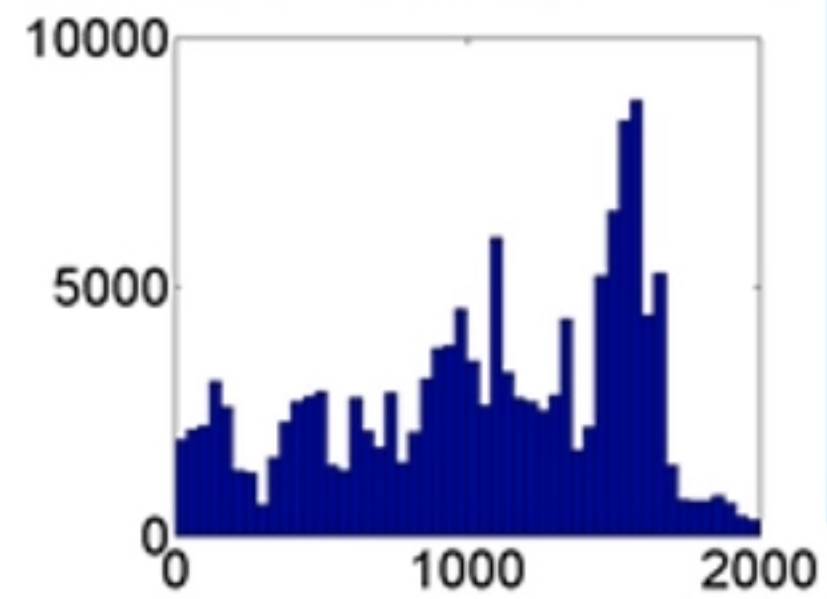
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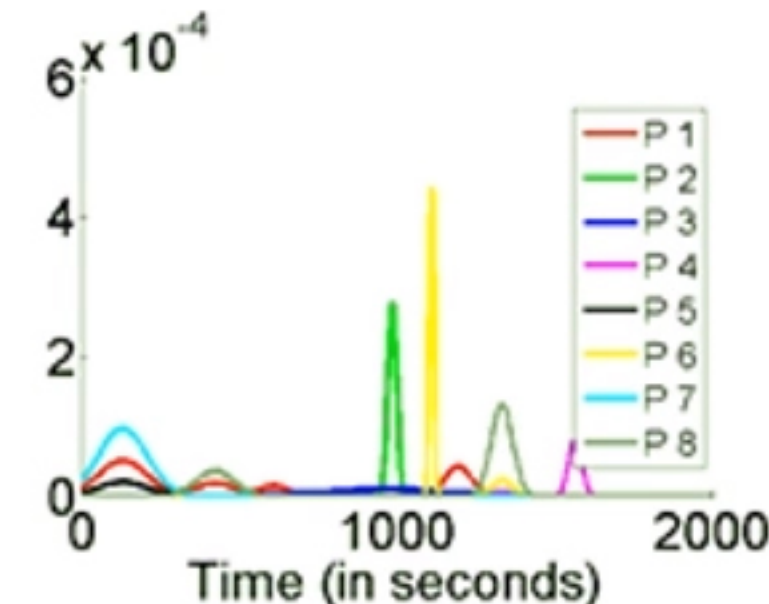
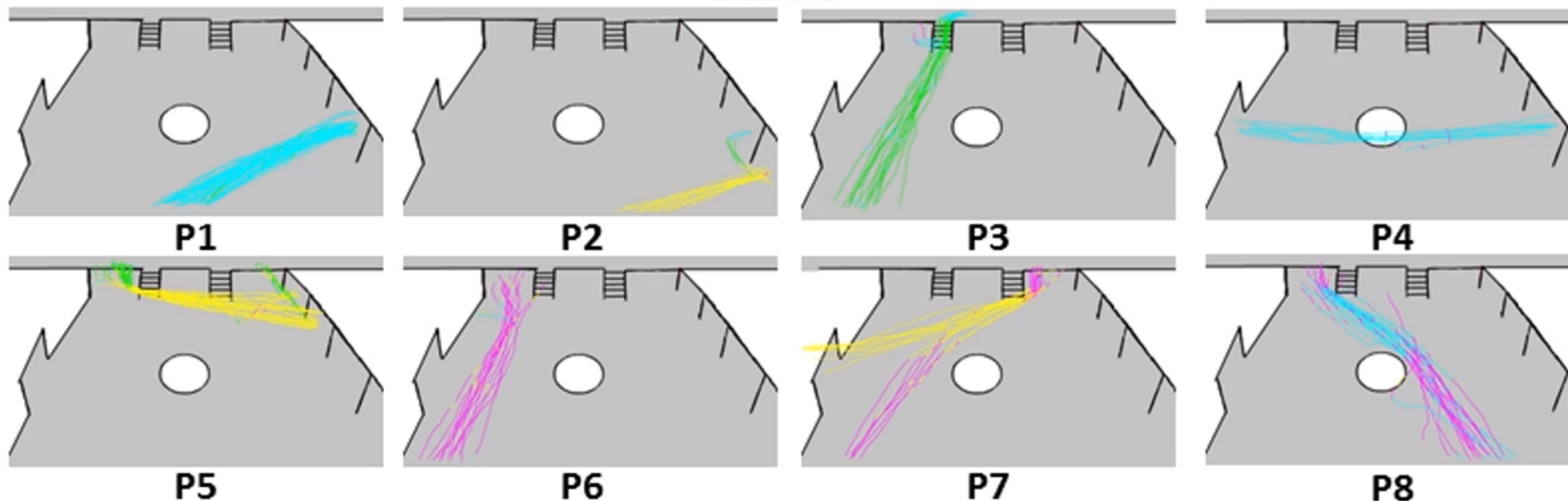
P9



Data



Results



Comparison

	STHDP	DHDP	MOTIF	$r_{correct}/r_{complete}$	STHDP	DHDP	MOTIF
Forum	-3.84	-9.8	-54.38	Forum	0.92/0.88	0.95/0.63	0.87/0.78
Carpark	-2.8	-7.75	-62.13	Carpark	0.83/0.9	0.89/0.31	0.85/0.42
TrainStation	-3.5	-4.9	-62.2	TrainStation	0.84/0.75	0.72/0.55	0.69/0.58

Thank You

Poster: ***S-4B-06***, Spotlight Session 4B: Human & Face