



# Temporal Segmentation of Egocentric Videos

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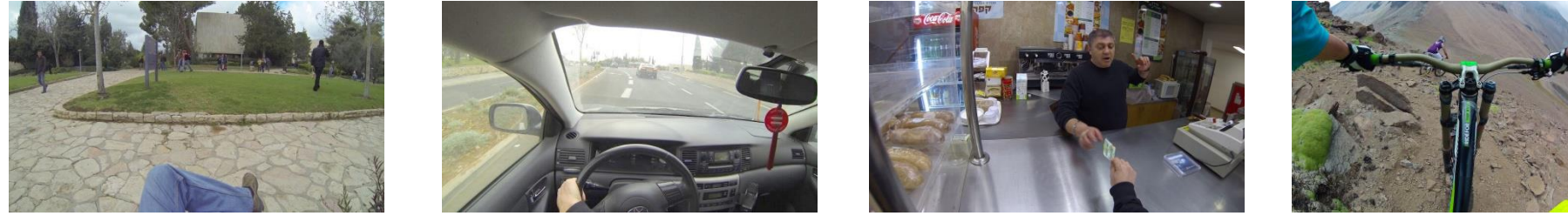
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## Egocentric Videos

- Egocentric Video = First person point of view



- Captured from:



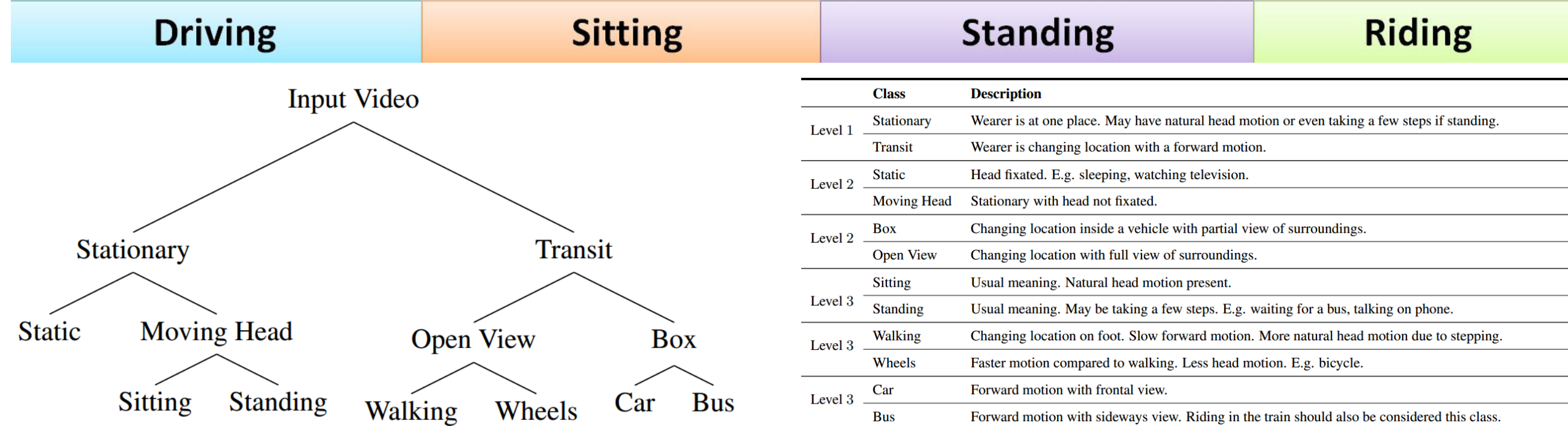
- Used by:



## Life Logging Egocentric Videos

- Always-on, infinite, unstructured video
- Video in the wild. Head is always moving, and head motion is always dominant.
- Very long and boring

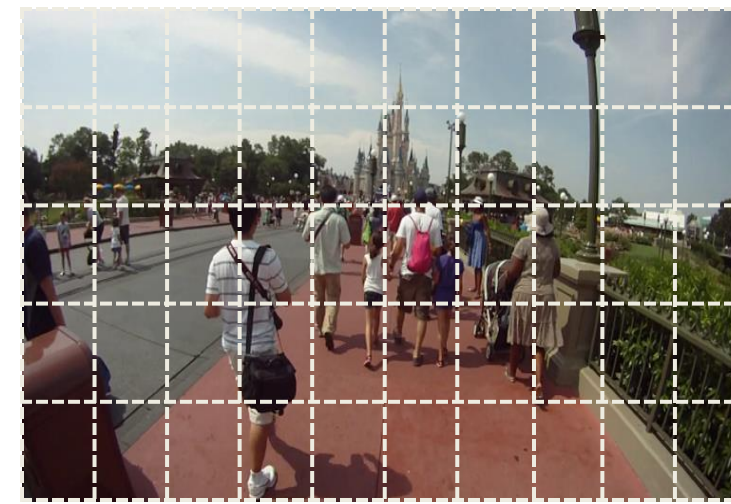
## Objective: Divide a long egocentric video into chapters



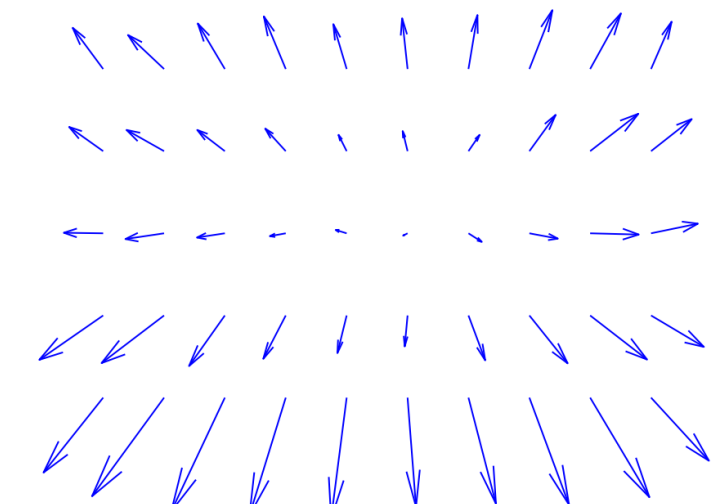
## Our Approach

### Demo Video

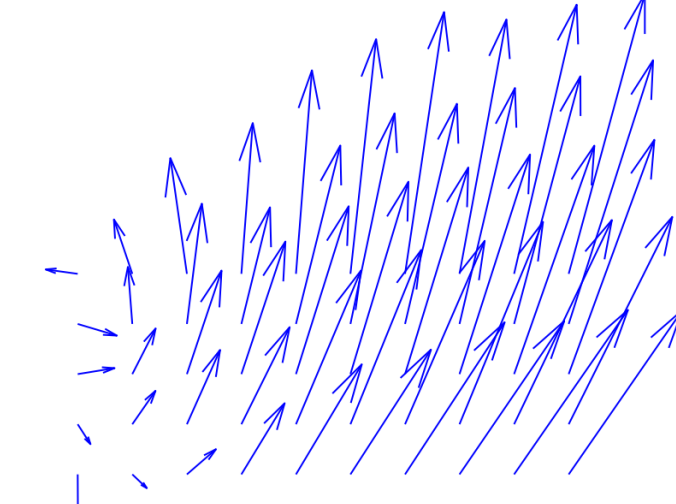
- (i) Estimate optical flow at fixed cells in all frames. No feature tracking.



Grid of 10x5 cells

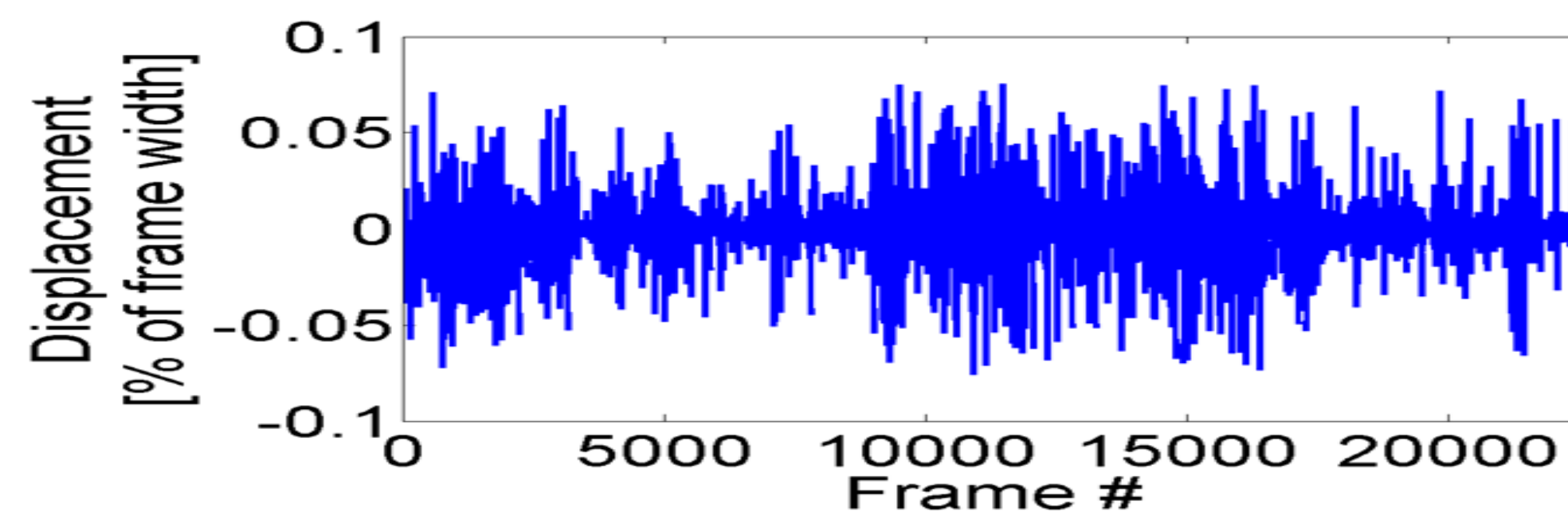


Expected Optical Flow

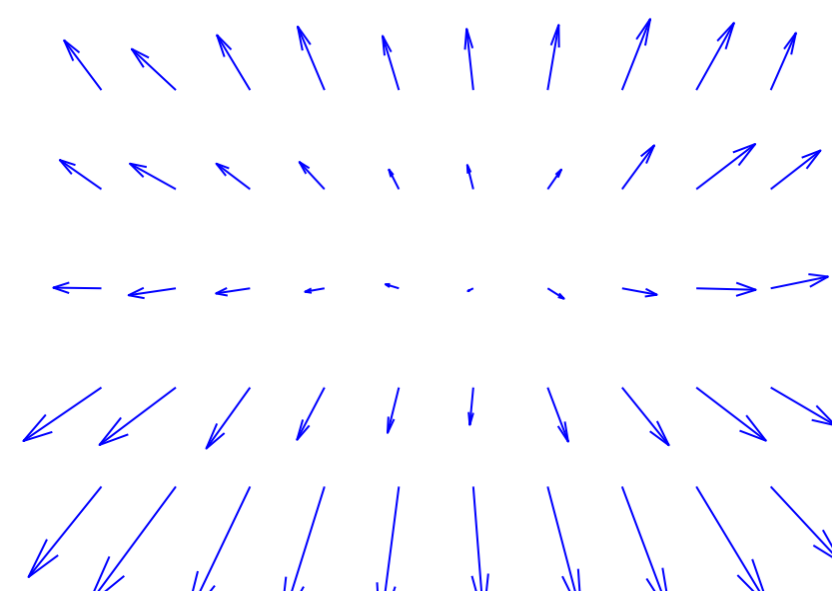


Measured Optical Flow

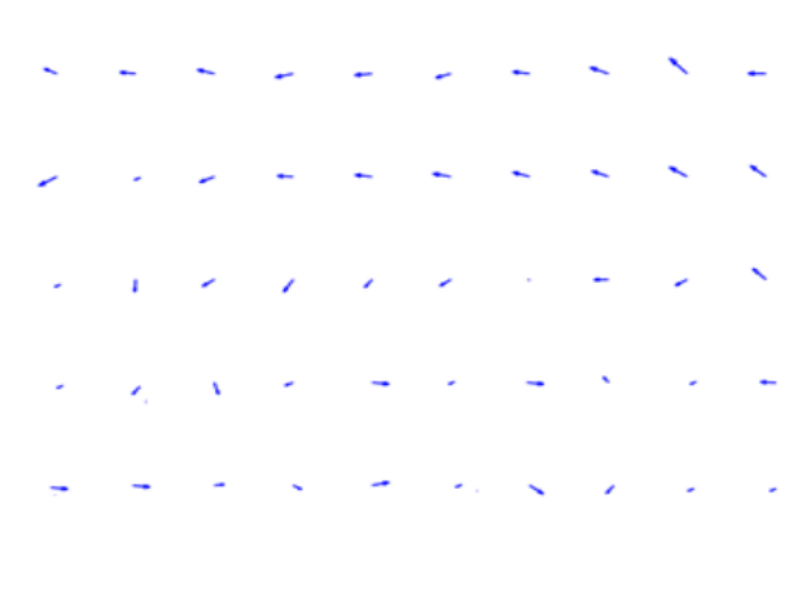
- (ii) Optical flow is dominated by head motion.



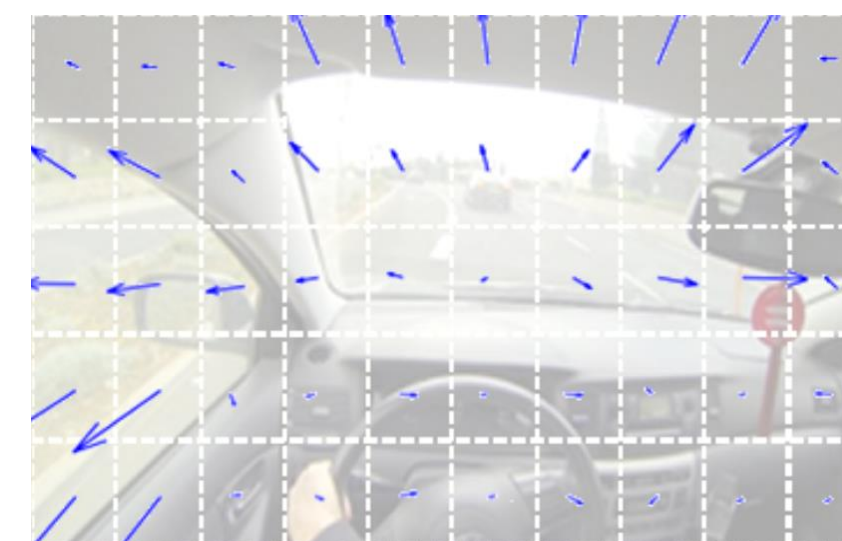
- (iii) Remove effects of head motion by temporal smoothing of optical flow



Walking



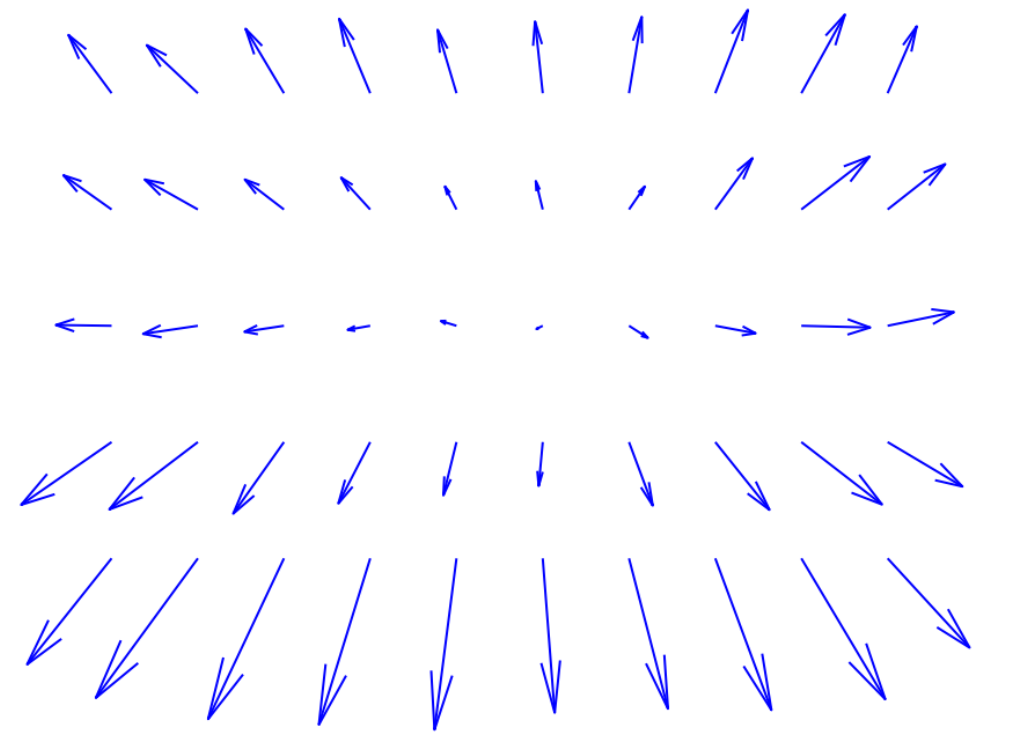
Standing



Driving

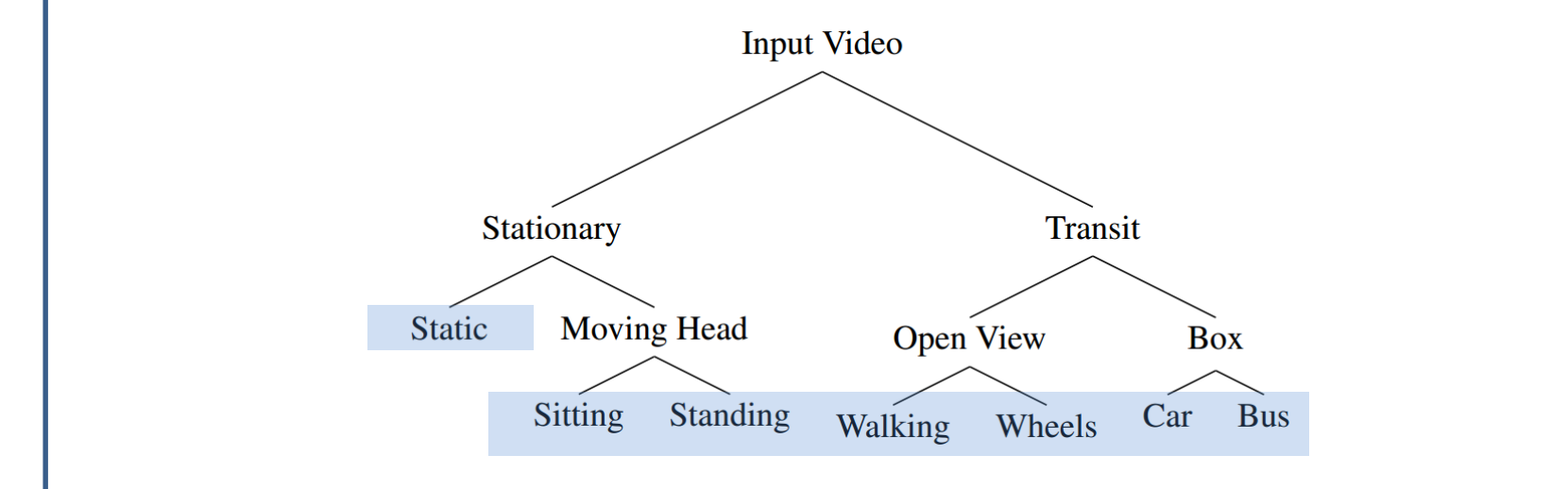
## Feature Vector

- Radial Projection Response
  - Find FOE, compute expansion template
  - Count motion vectors satisfying template
- Motion vectors magnitude clusters
- Statistical information:
  - Number of blocks with valid optical flow
  - Average & variance of flow magnitudes

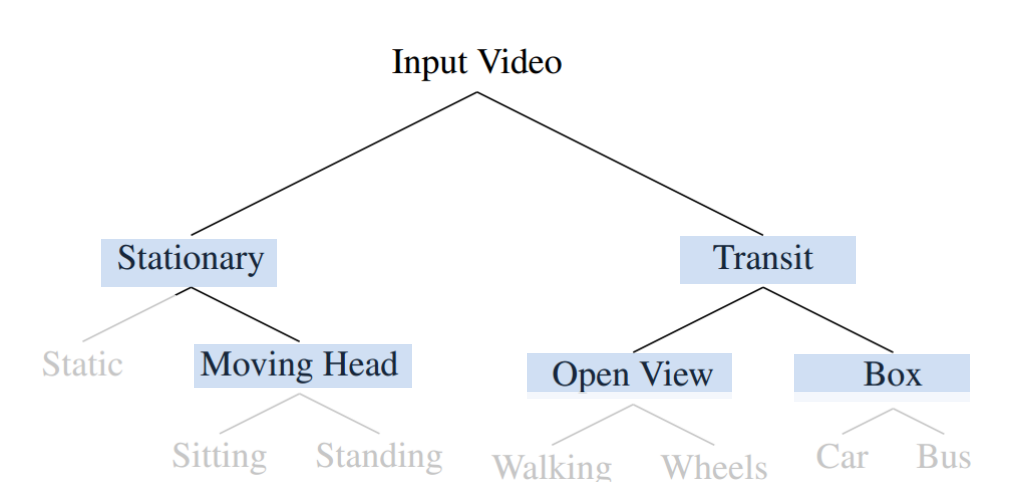


## Results

- Dataset:
  - Training set: 140 sequences, 65hrs, ~3.5M frames
  - All labeled into 7 classes by students
- Training:
  - Randomly pick a sequences until we cover 12K samples per class
  - Training sequences are excluded from the test
- Test Set: Unseen sequences



	Walking	Car	Standing	Bus	Wheels	Sitting	Static
Walking	83%	0%	6%	6%	4%	1%	0%
Car	1%	74%	3%	15%	0%	3%	4%
Standing	14%	2%	47%	4%	0%	31%	2%
Bus	3%	19%	27%	43%	0%	7%	1%
Wheels	9%	0%	0%	6%	86%	0%	0%
Sitting	3%	1%	22%	1%	0%	62%	10%
Static	0%	1%	1%	0%	0%	1%	97%



Class Label	Accuracy	# Samples
Static-Moving	91%	1083115
Sitting-Standing	82%	1036217
Box-Open	87%	1197623
Car-Bus	76%	228108
Walking-Wheels	82%	969515