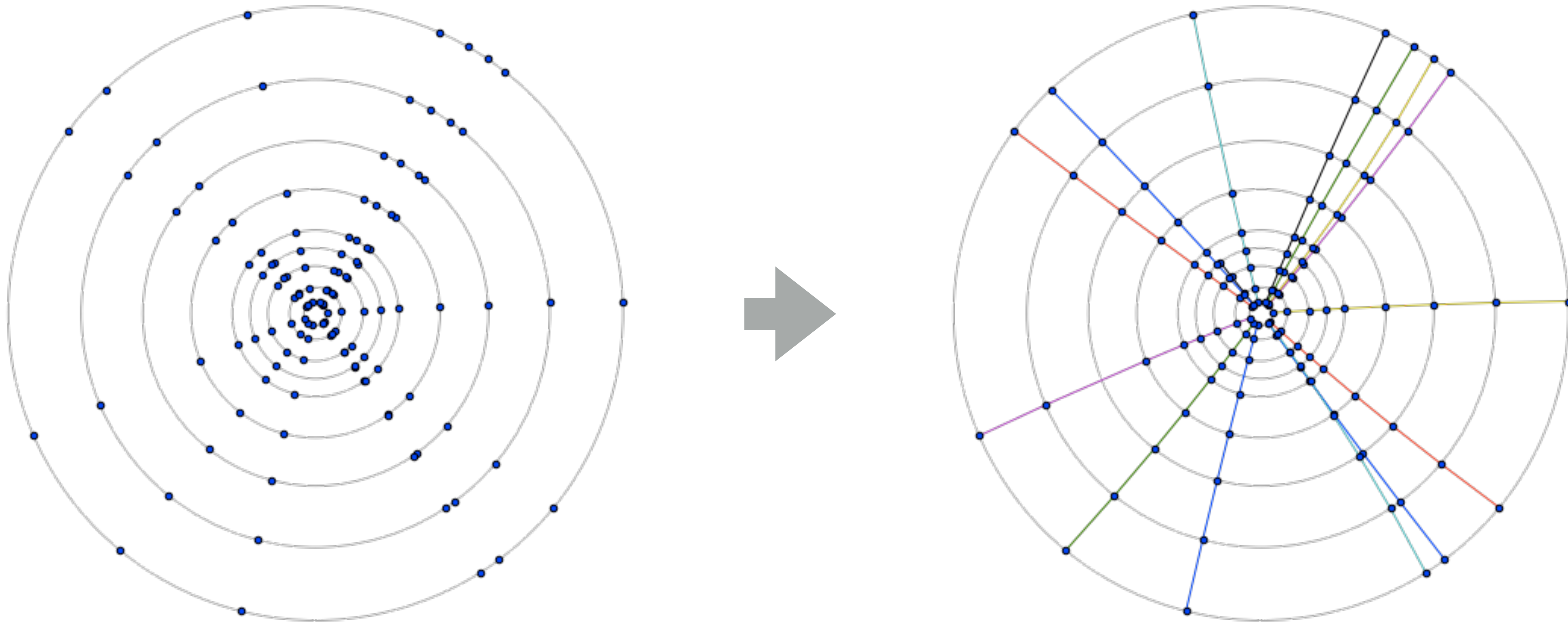


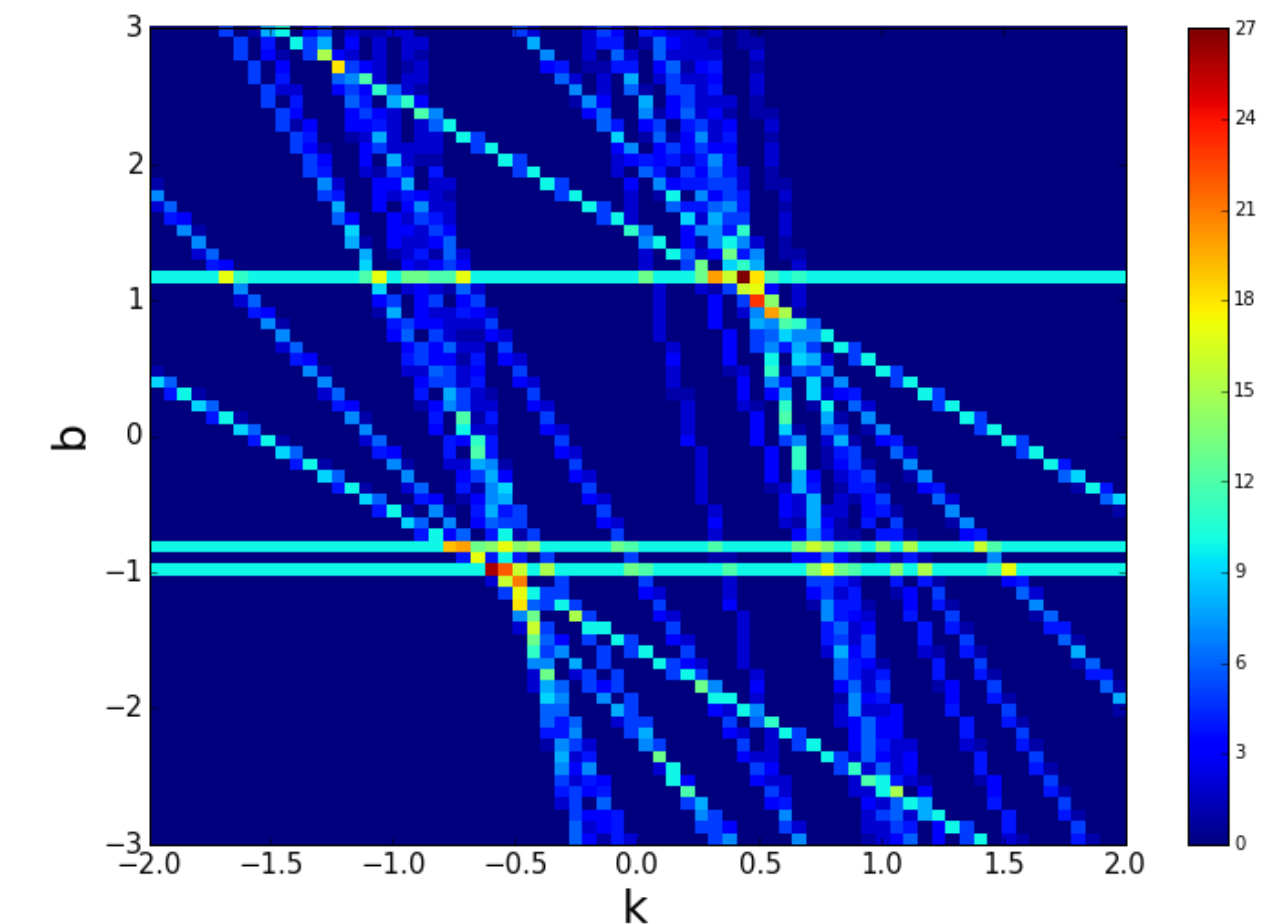
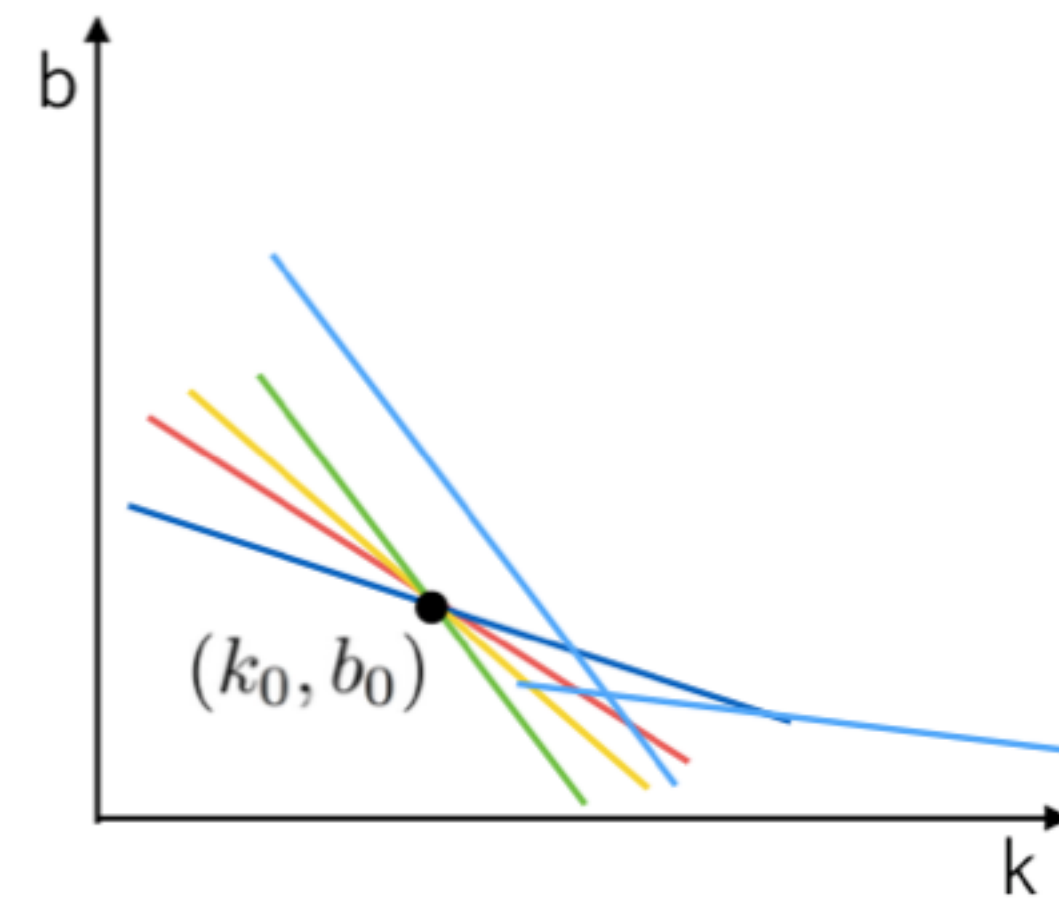
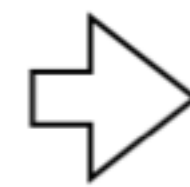
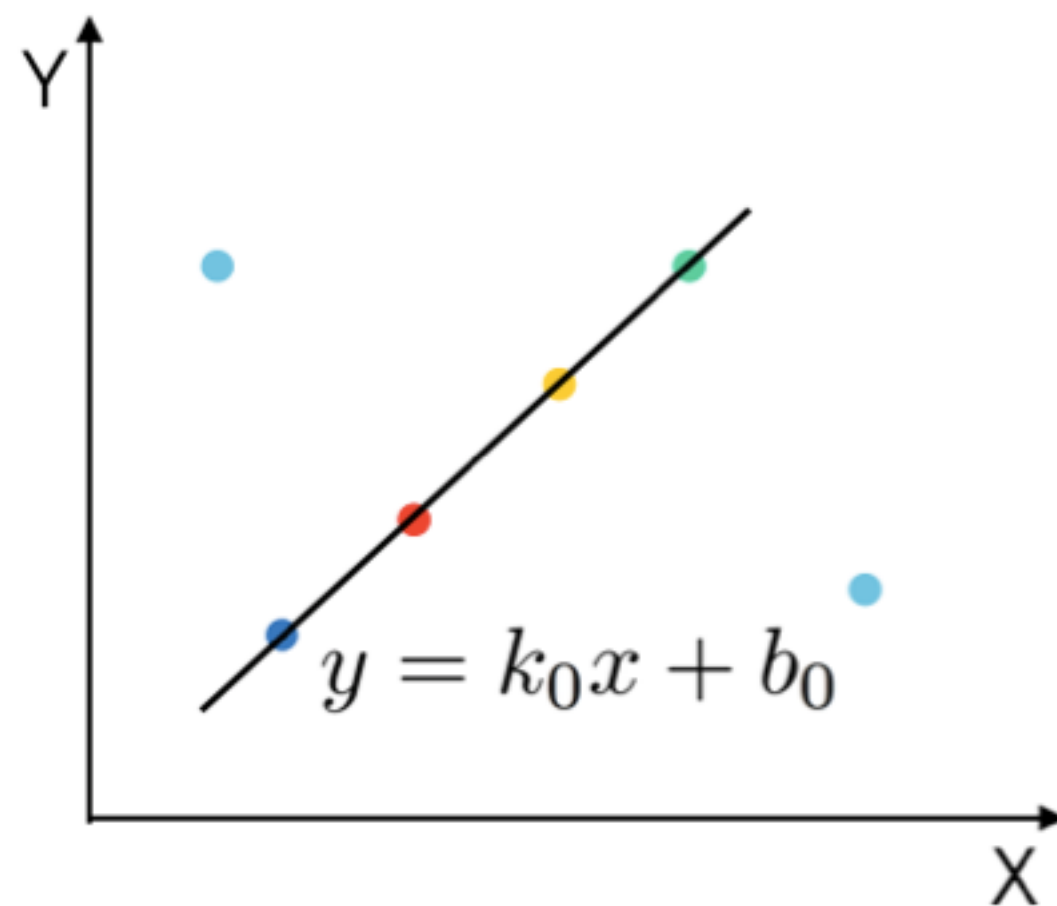
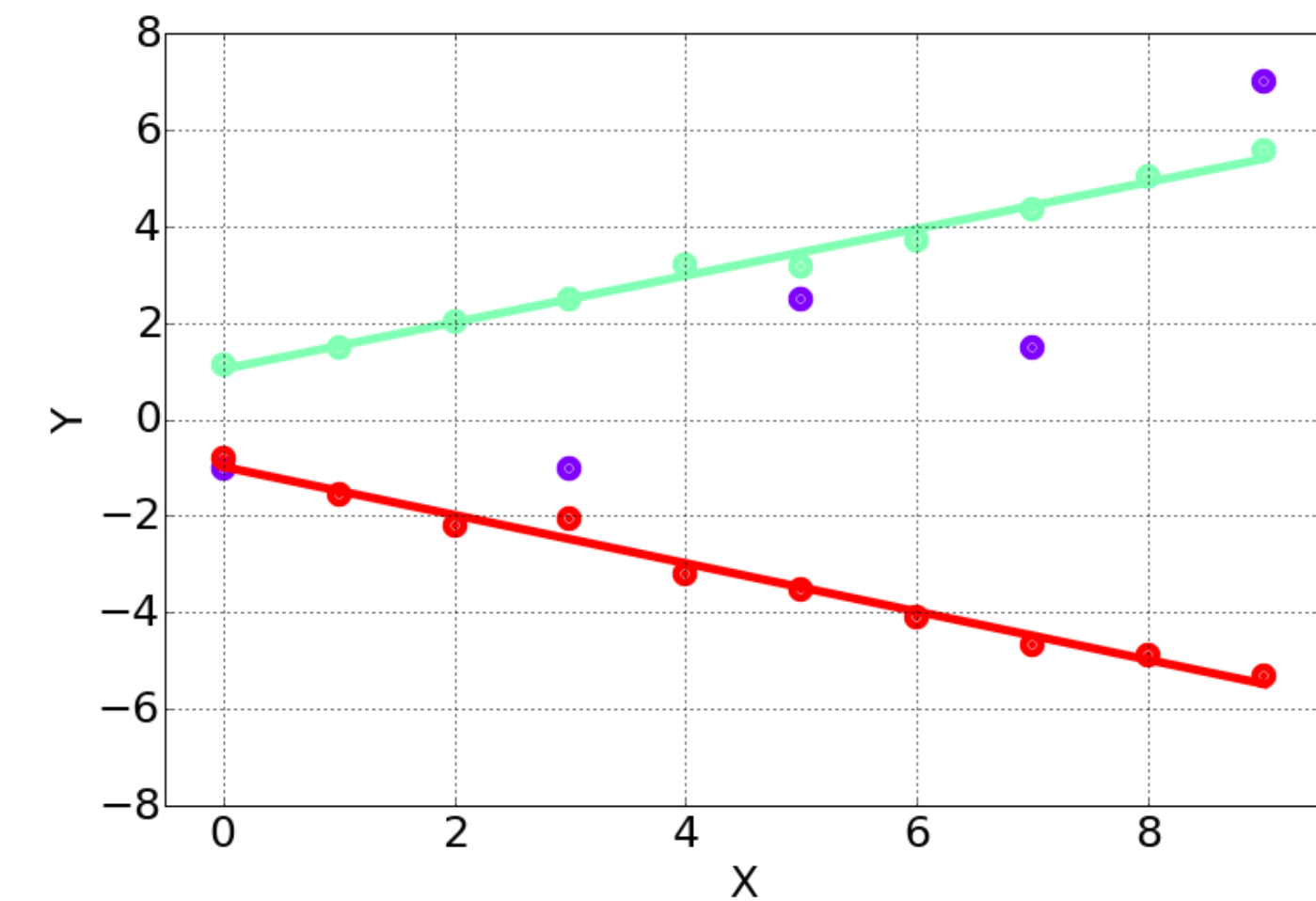
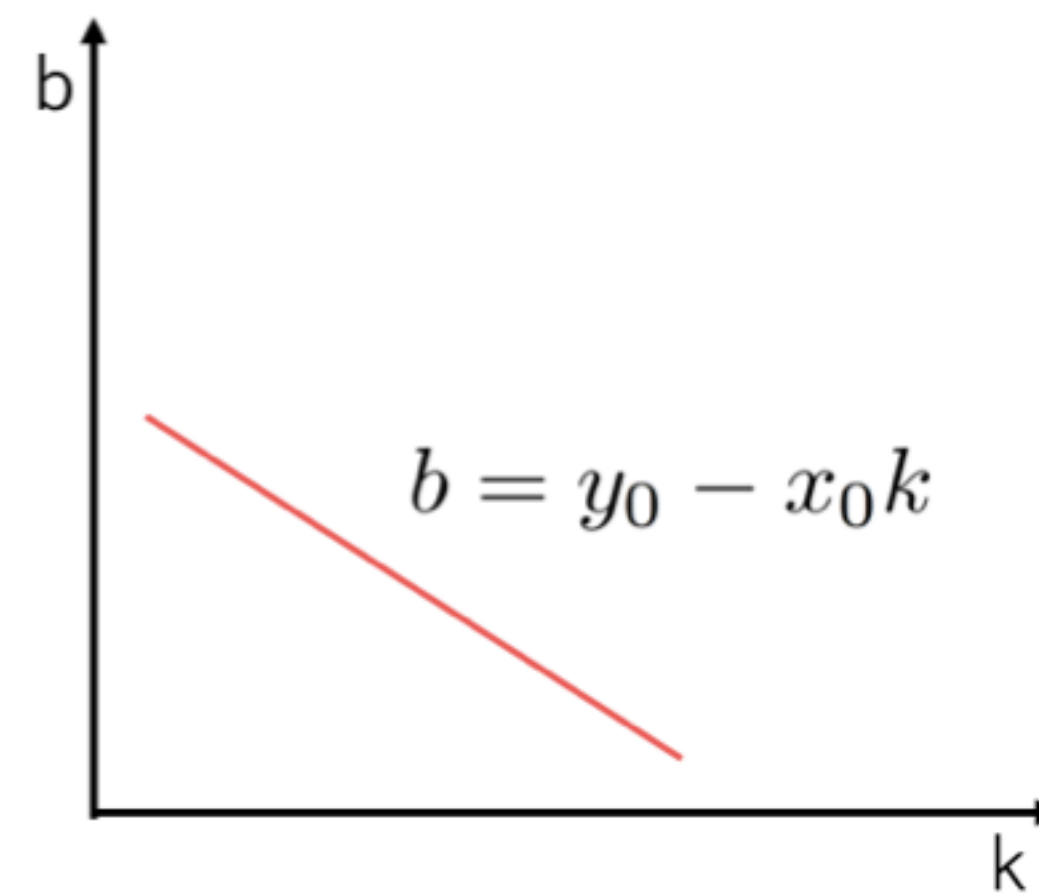
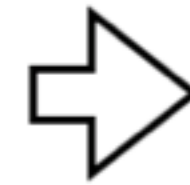
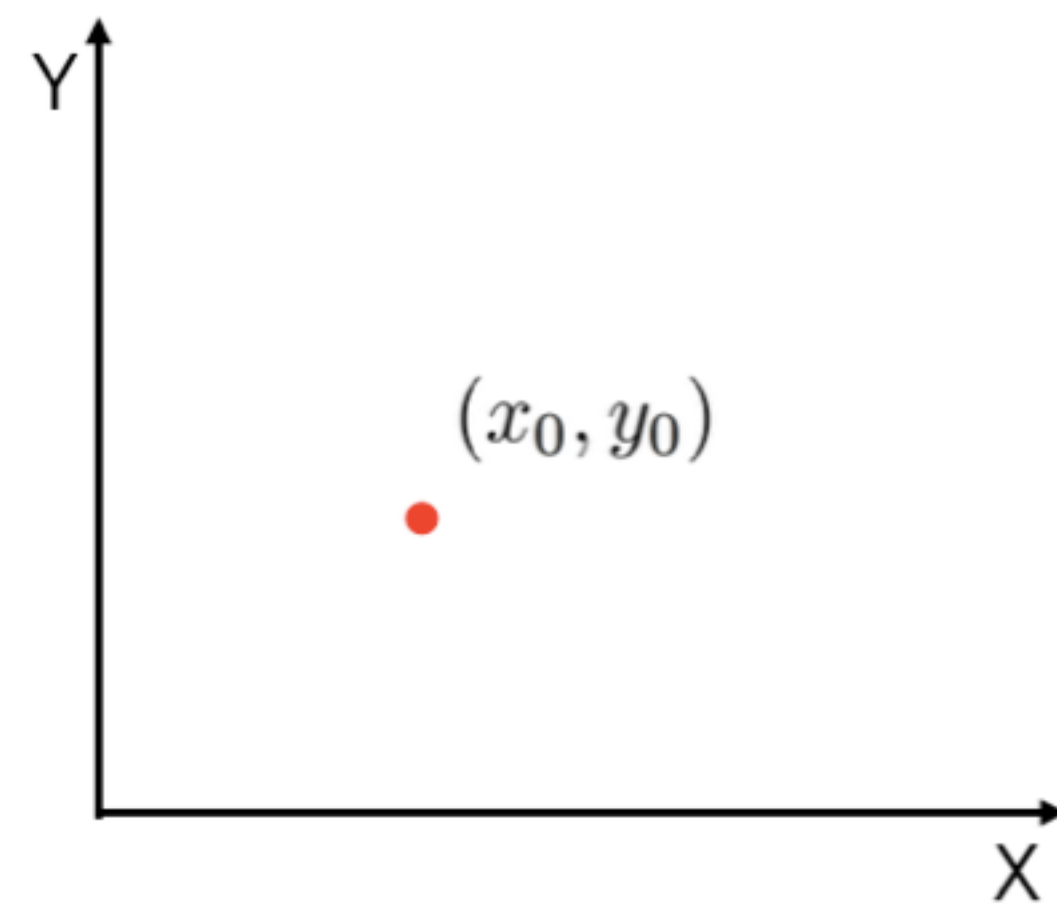
ML for Tracking

Mikhail Hushchyn

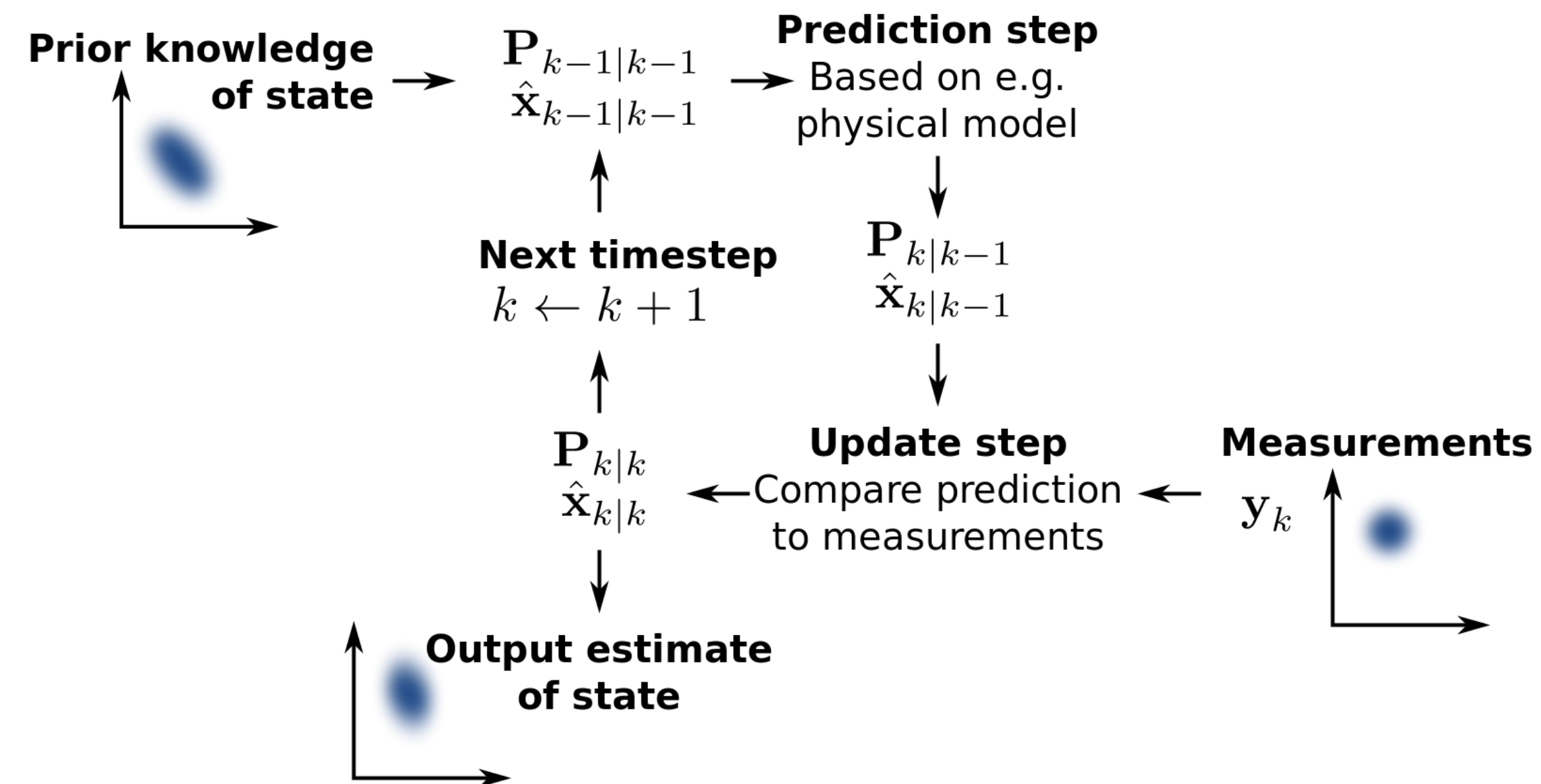
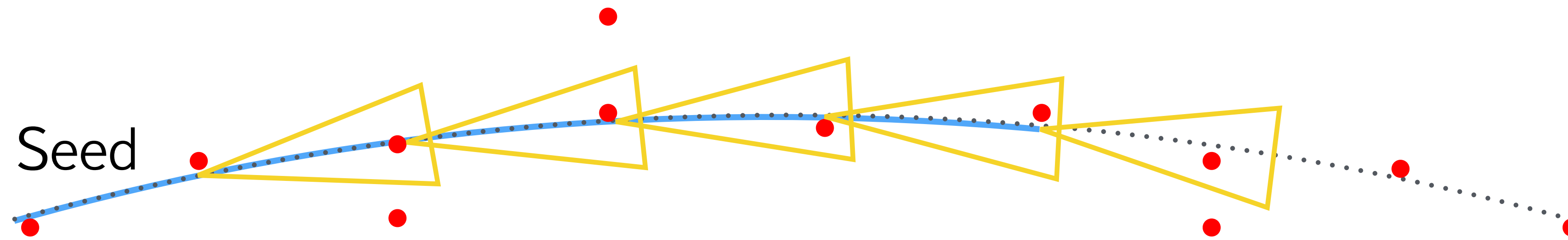
Track Pattern Recognition



Popular Methods: Hough Transform



Popular Methods: Kalman Filter

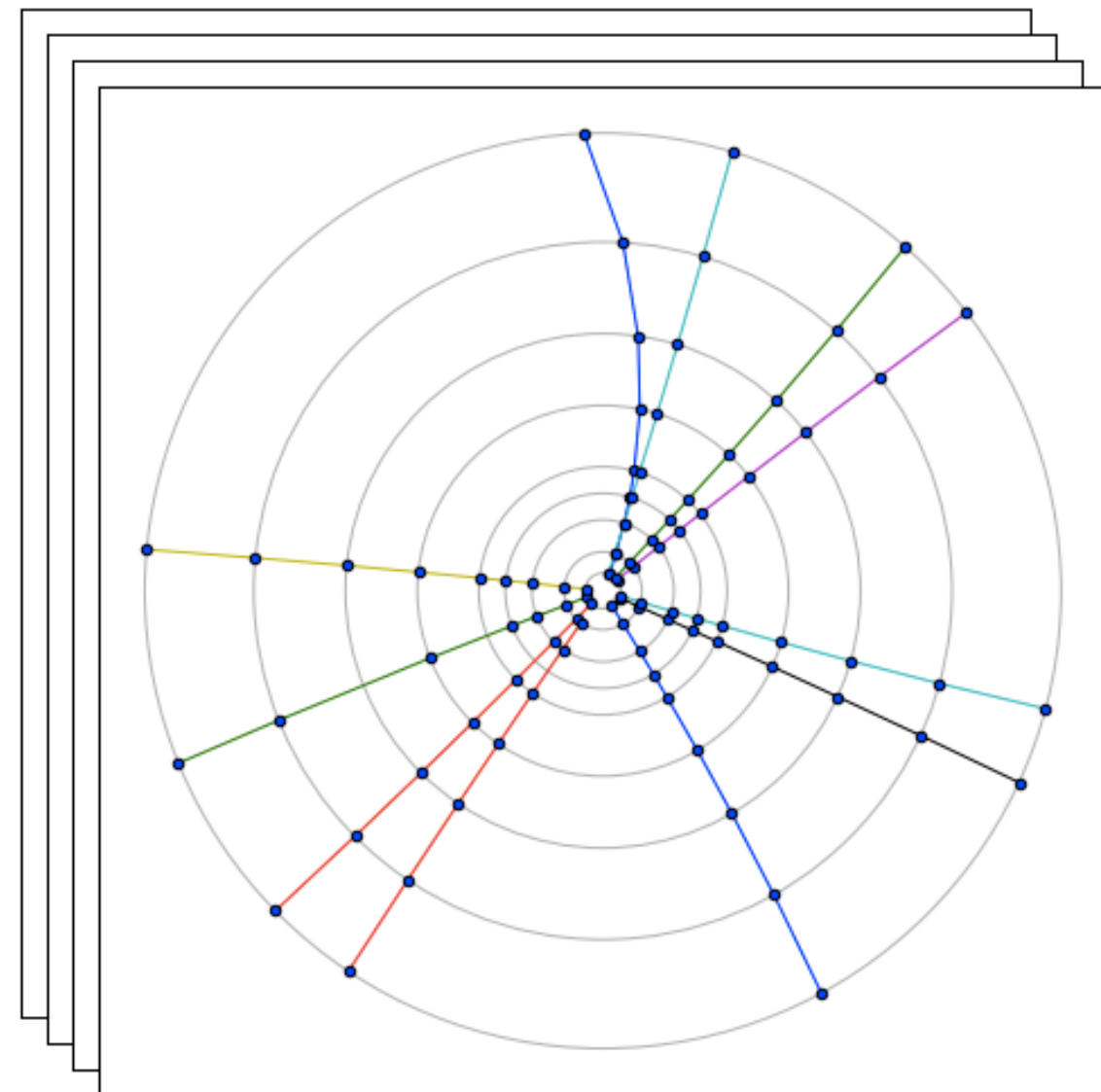


ML for Track Pattern Recognition

Goal is to develop a new track pattern recognition method which:

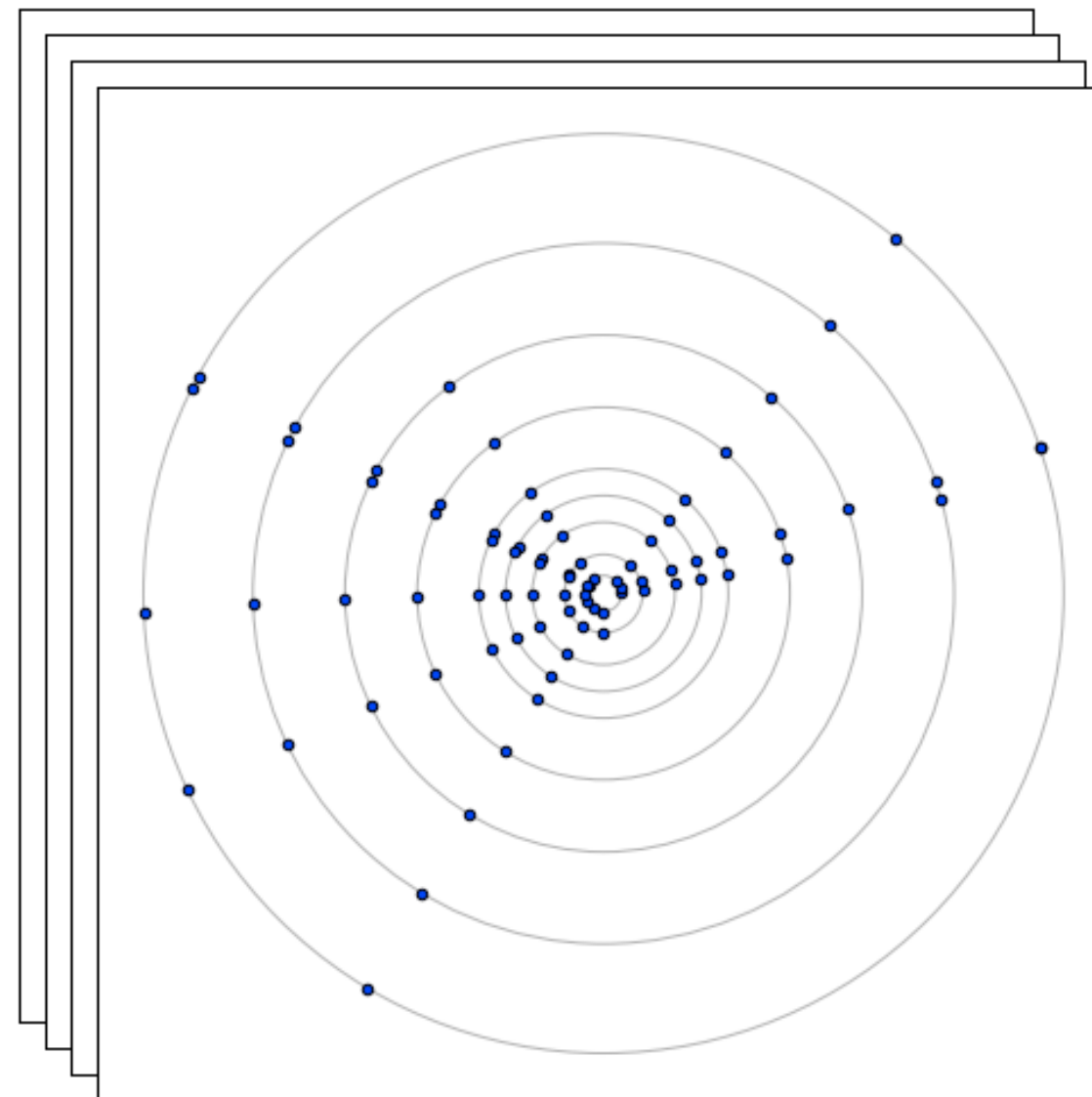
- › Learns a track shape from data
- › Learns a detector geometry from data
- › Learns to separate track and noise hits from data

Idea

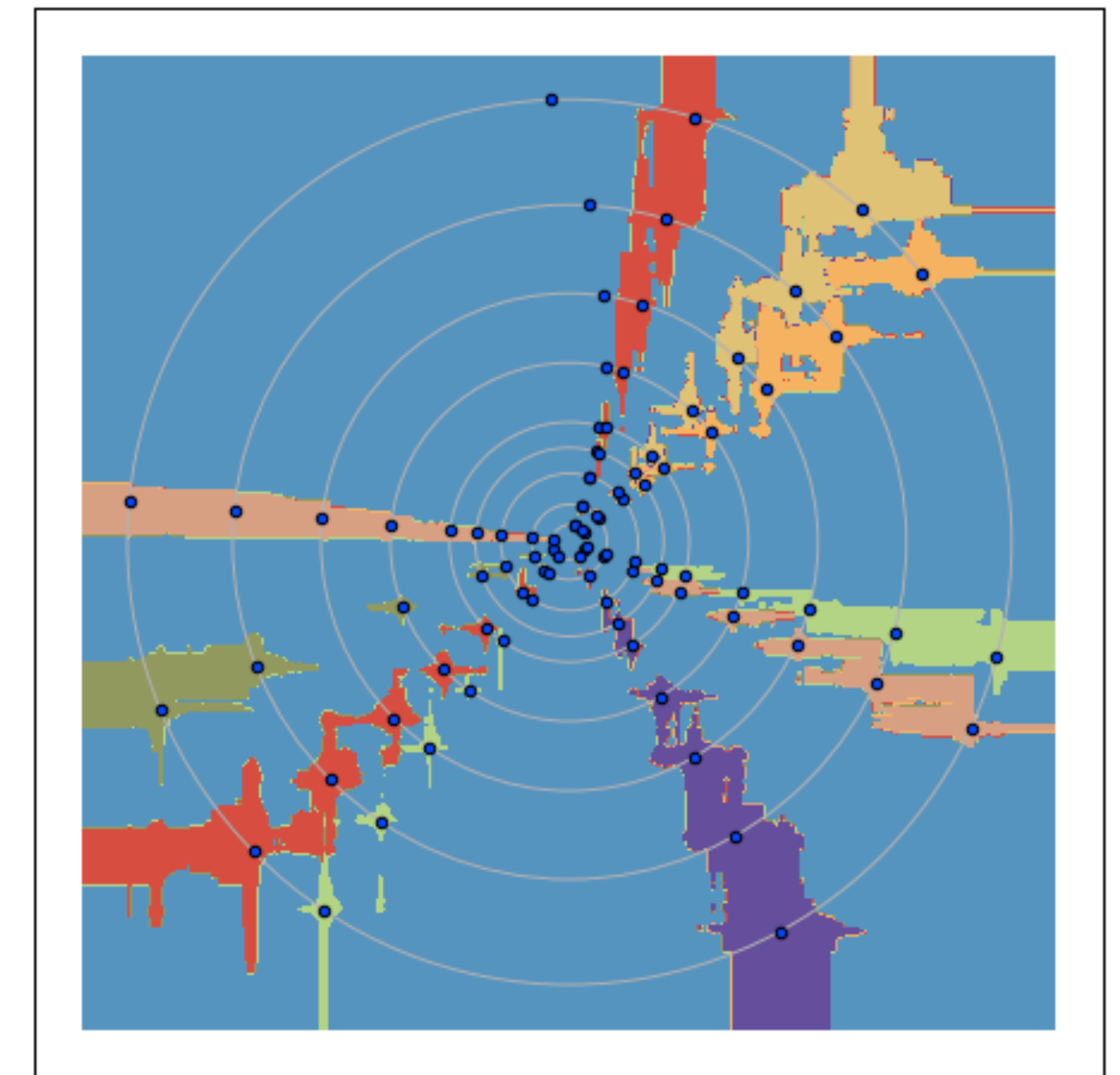
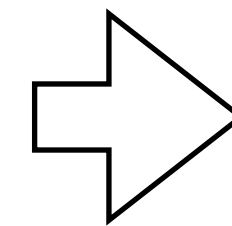


Signal Events

+

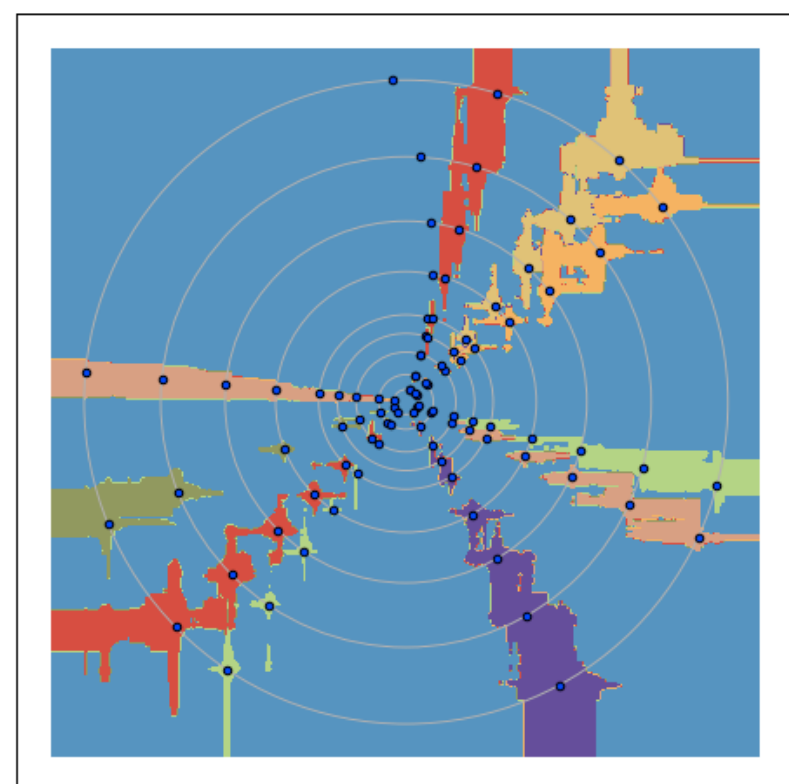
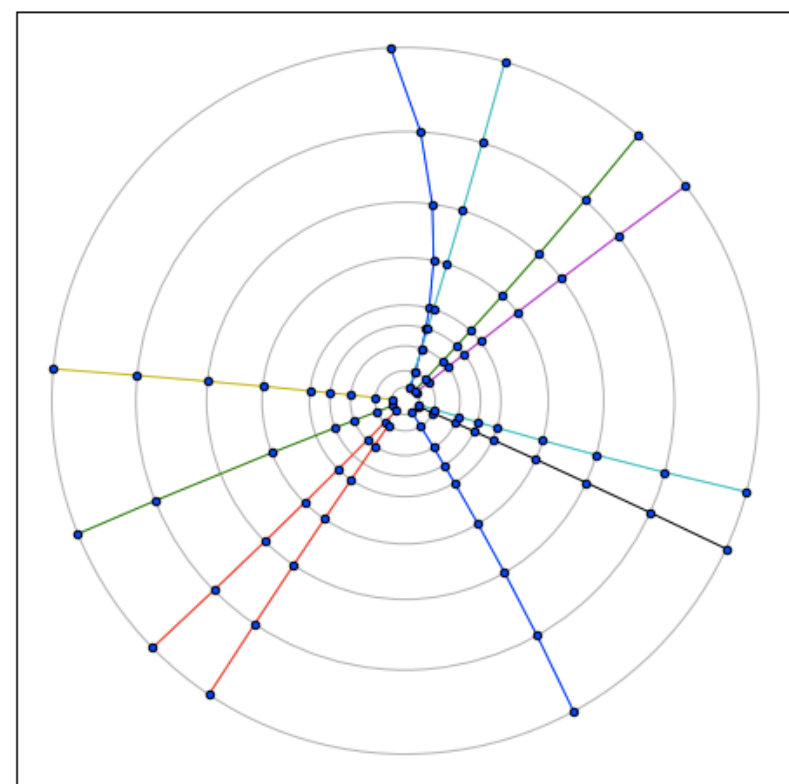


Bkg Events

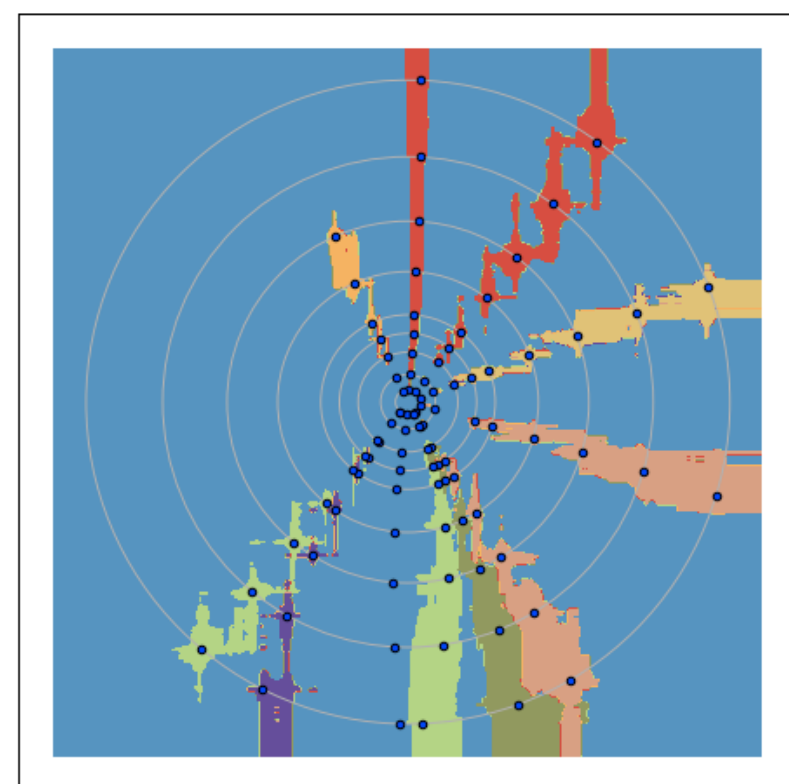
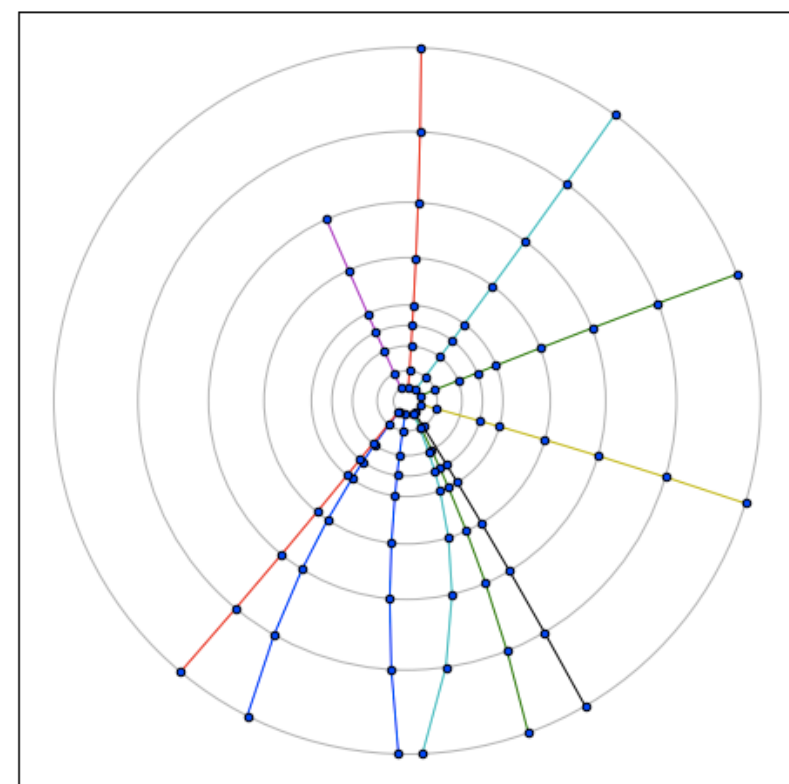


Trained Classifier

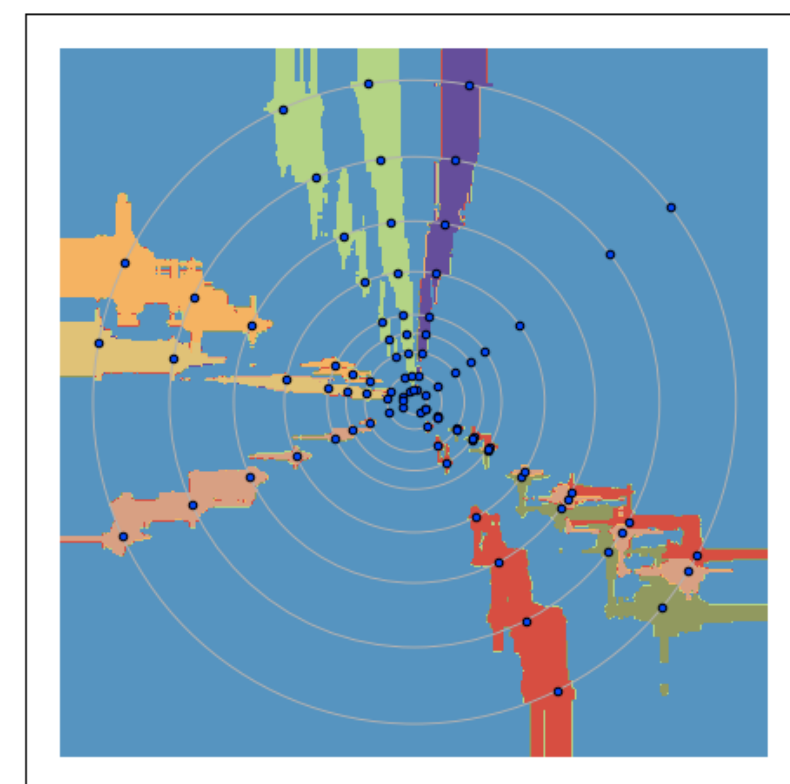
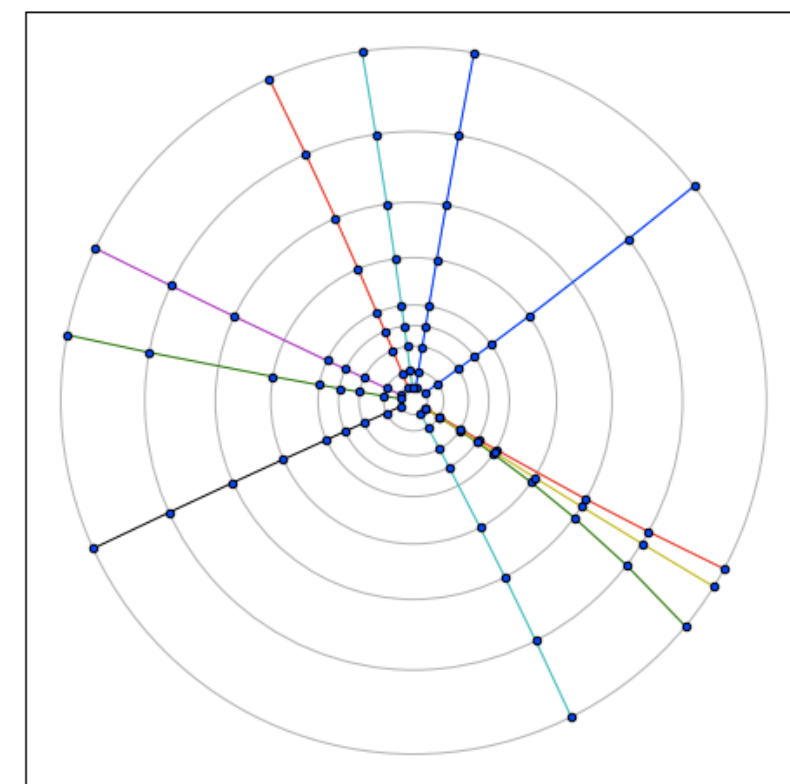
Train



Classifier 1

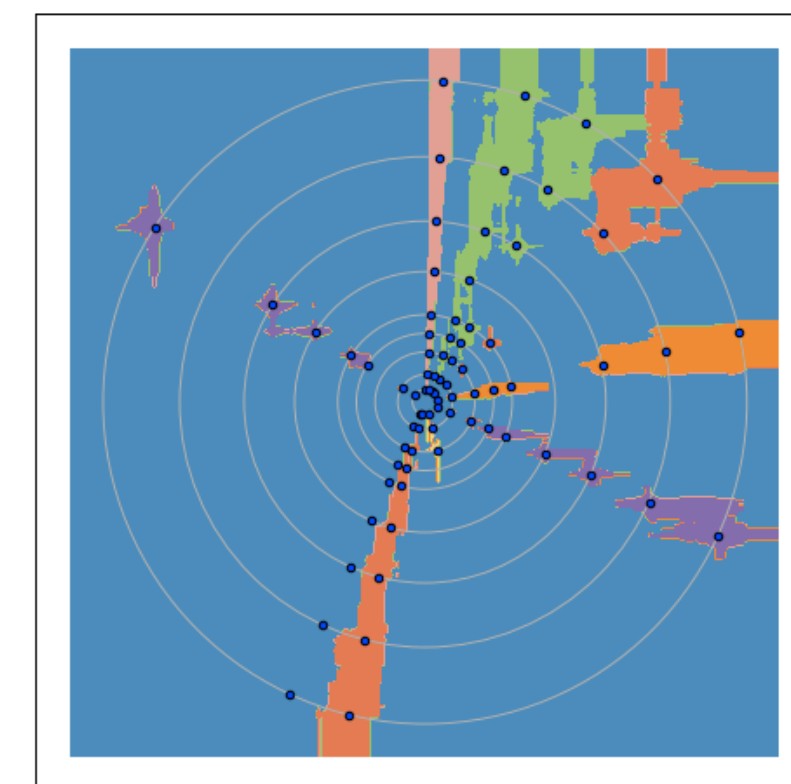
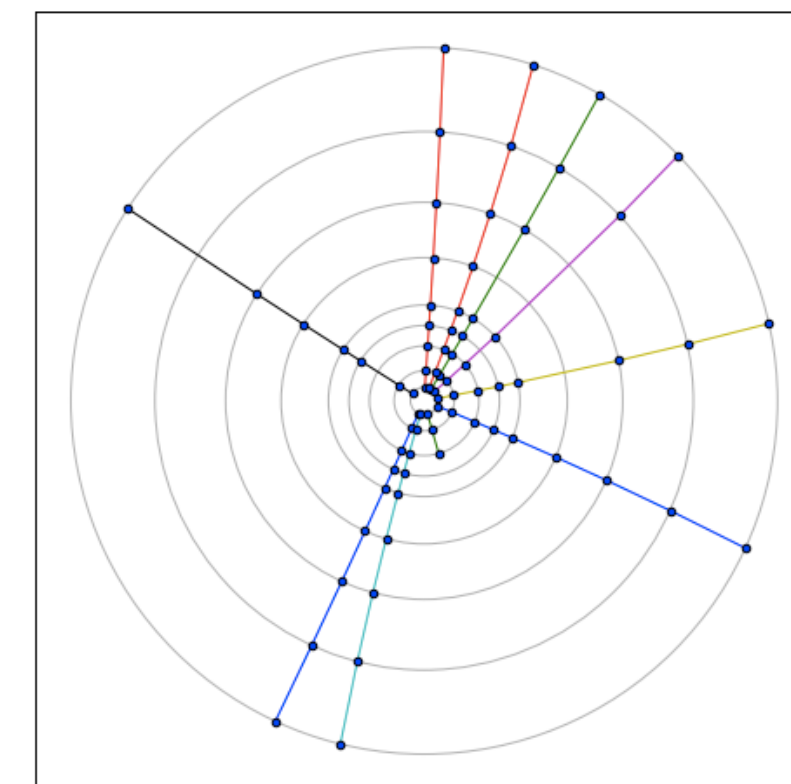


Classifier 2



Classifier 3

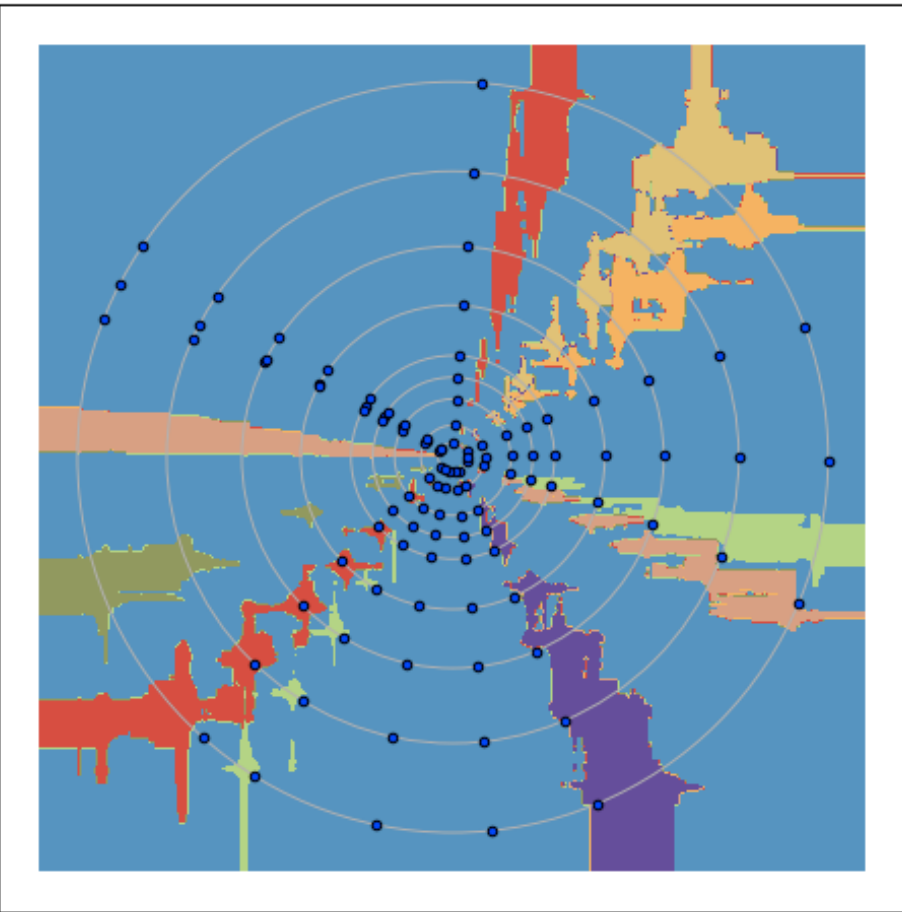
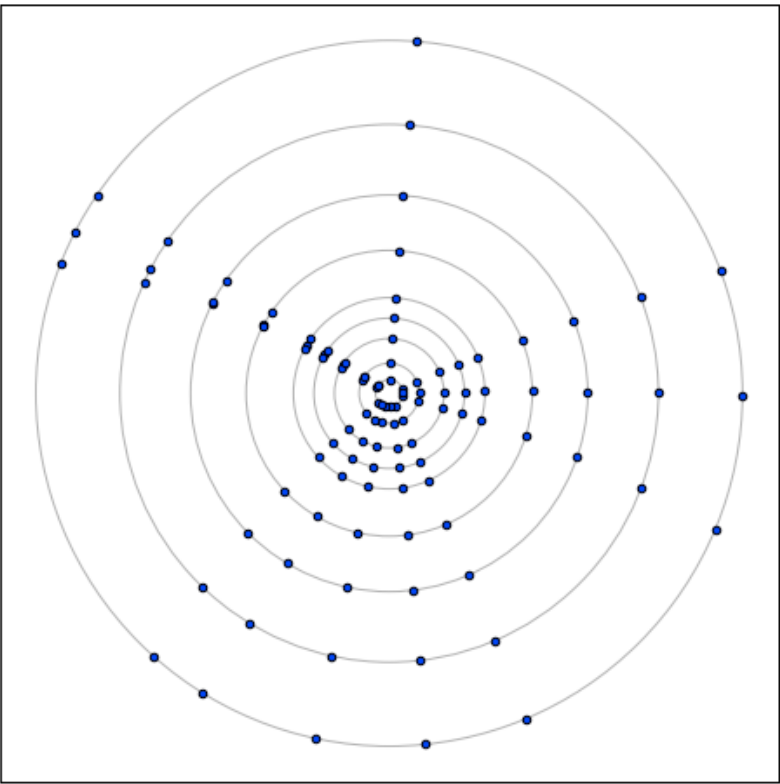
...



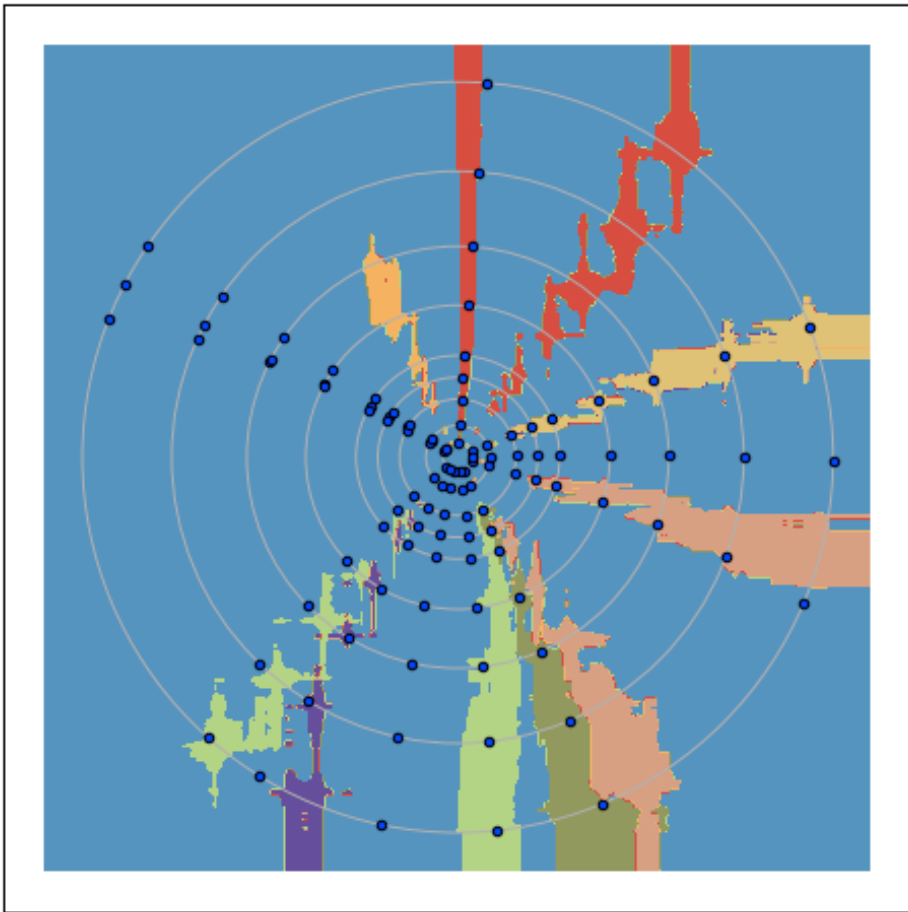
Classifier N

...

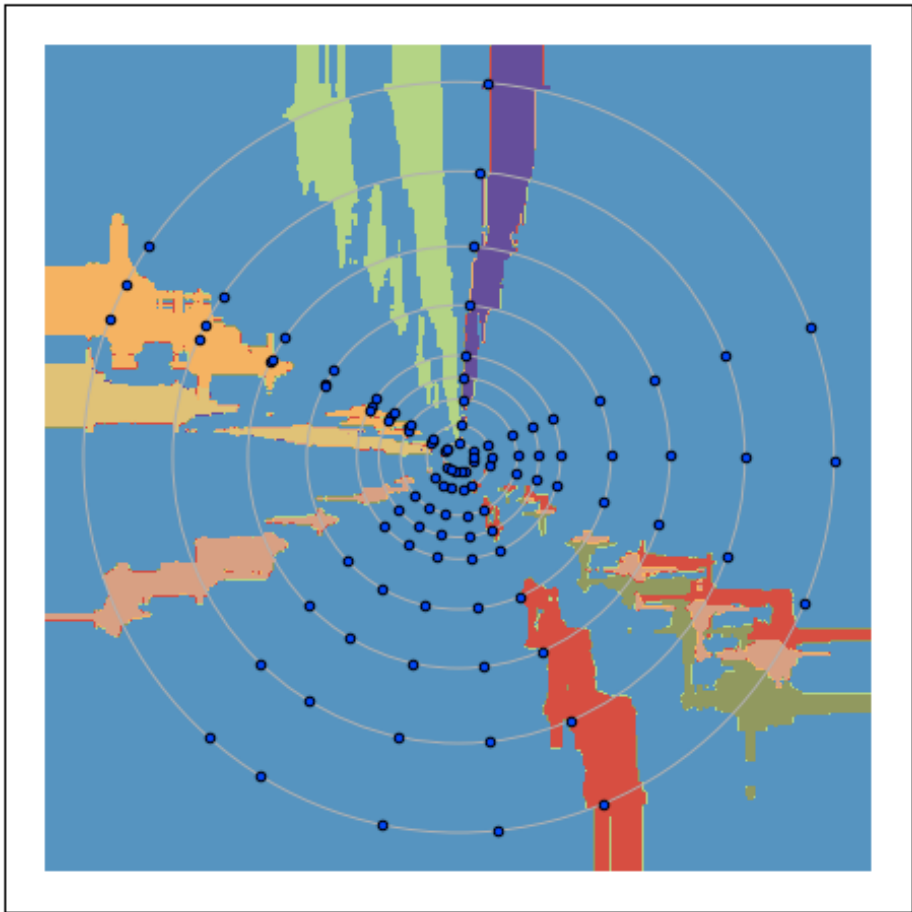
Predict



Reco Tracks 1

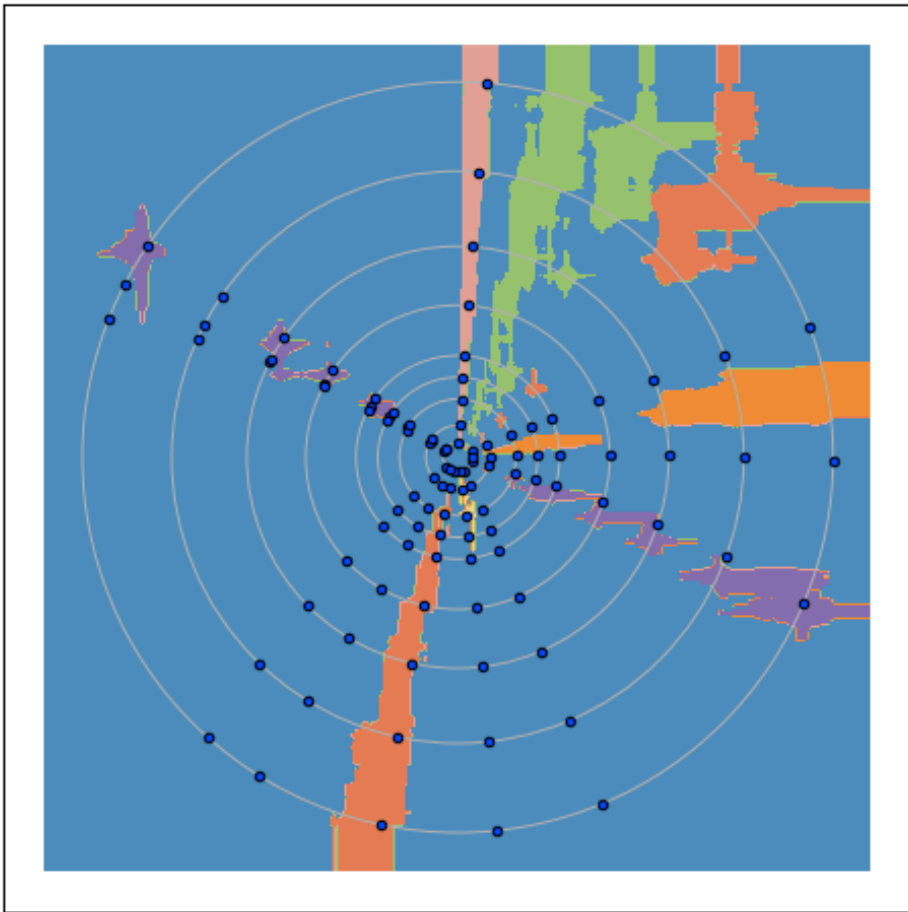


Reco Tracks 2



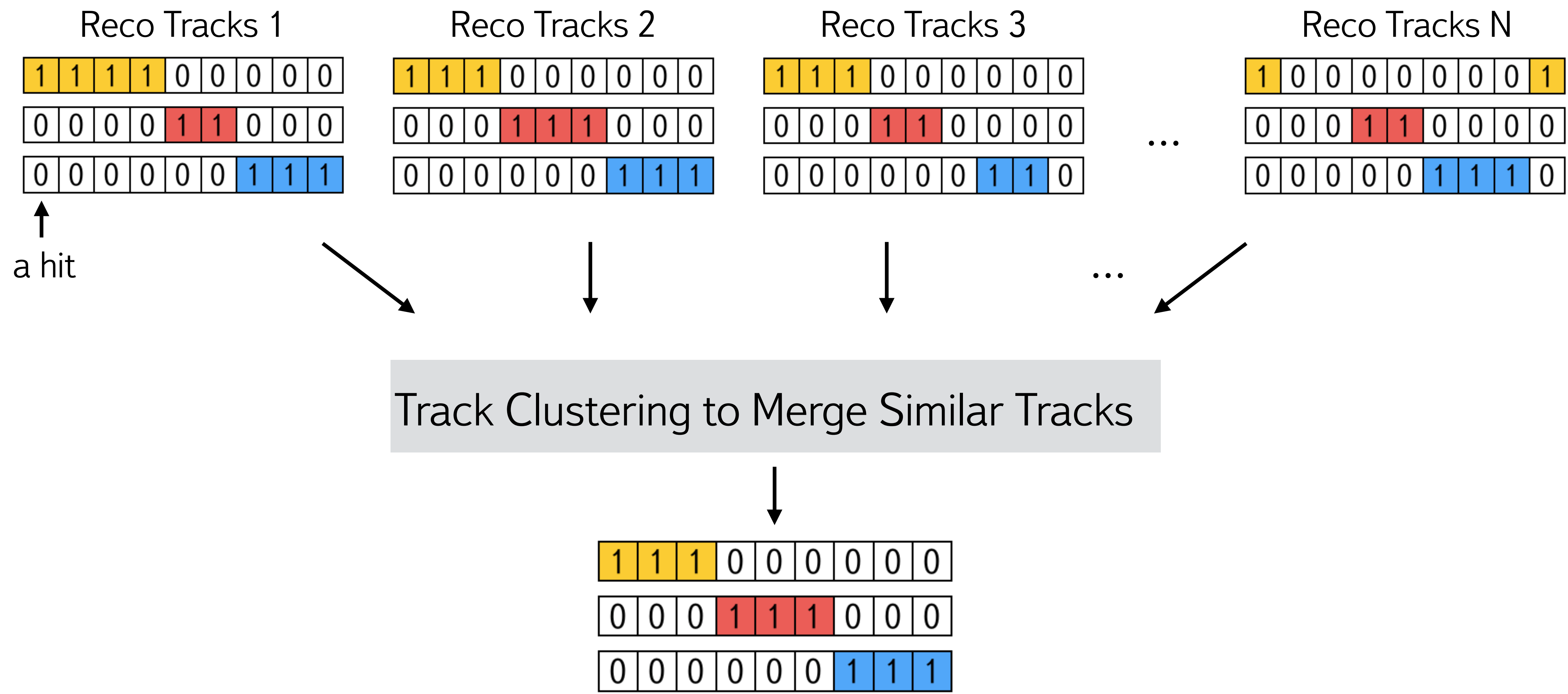
Reco Tracks 3

...

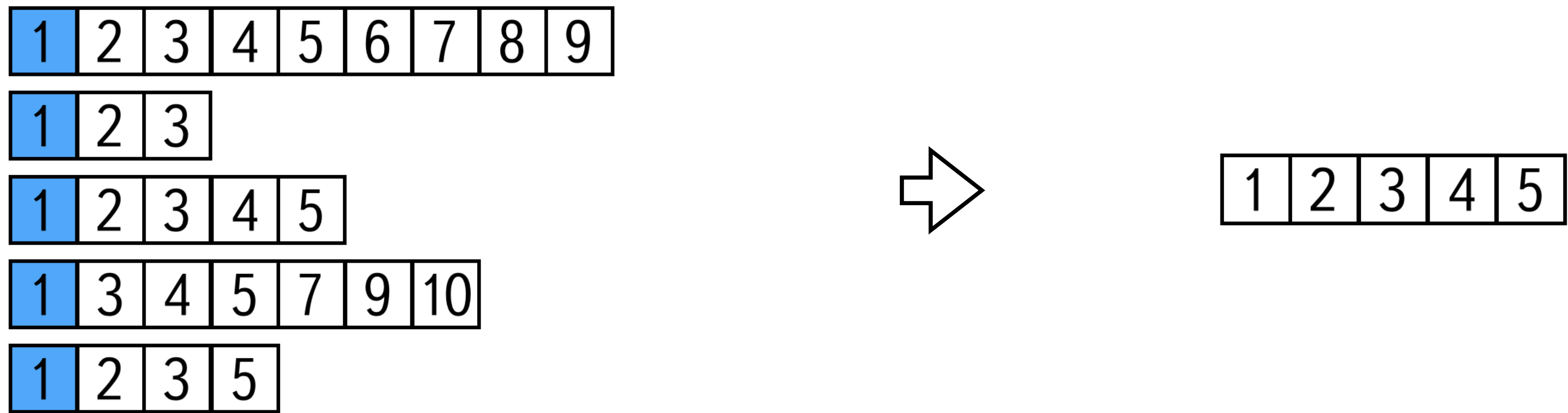


Reco Tracks N

Combination (clustering)



Combination (hit voting)



Hit	1	2	3	4	5	6	7	8	9	10
Frac.	1	0.8	1	0.8	0.8	0.2	0.4	0.2	0.4	0.2

Usage

- › It needs just hits
- › No track shape
- › No detector geometry
- › No noise reduction

Everything is learnt from data!