

Other types of tour

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1. Motivating example
2. The guided tour
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4. Other display methods

Prim7

7-d particle physics data.

What can we see? A grand tour takes a long time.

D. Cook, A. Buja, J. Cabrera, and C. Hurley.
Grand tour and projection pursuit. Journal of
Computational and Graphical Statistics,
4 (3):155–172, 1995.

Guided tour

Instead of wandering around randomly, we wander towards interesting projections.

A dynamic form of projection pursuit.
Need to define what interesting means.

Indices

Central mass: closeness to standard normal (Friedman & Diaconis, 1984)

Holes: distance from standard normal

LDA: linear discriminant analysis.

Interesting = a view that separates the different colours of points.

Back to the data...

Optimisation

Two approaches: simulated annealing, stochastic geodesic search

Neither is terribly sophisticated, and neither has much mathematical justification, but they both seem to work in practice.

Ability to intervene in optimisation processes makes up for a lot!

Simulated annealing

A stochastic optimisation technique.

Take small steps in a random direction. If the step results in more interesting view take it, if it is less interesting, only take it with some probability. (Sometimes you need to go downhill to go uphill)

Steps get smaller and probability of accepting worse view decreases, to guarantee convergence.

search

Generate a random frame, and then perform a 1d search along the geodesic.

Repeat n times, and pick the best direction.

Seems to converge quickly, but no real justification. (Analogous to coordinate wise descent)

Tour paths

Other methods

Grand tour: select uniformly

Guided tour: bias towards interesting

Planned tour: preselected

Independence tour: different variables on different axes

Little tour: axis parallel only

Local tour: only nearby projections

Equivalence of multivariate techniques

Grand tour: PCA

Guided tour: projection pursuit

Correlation tour: CCA

Independence tour: GCA

Display techniques

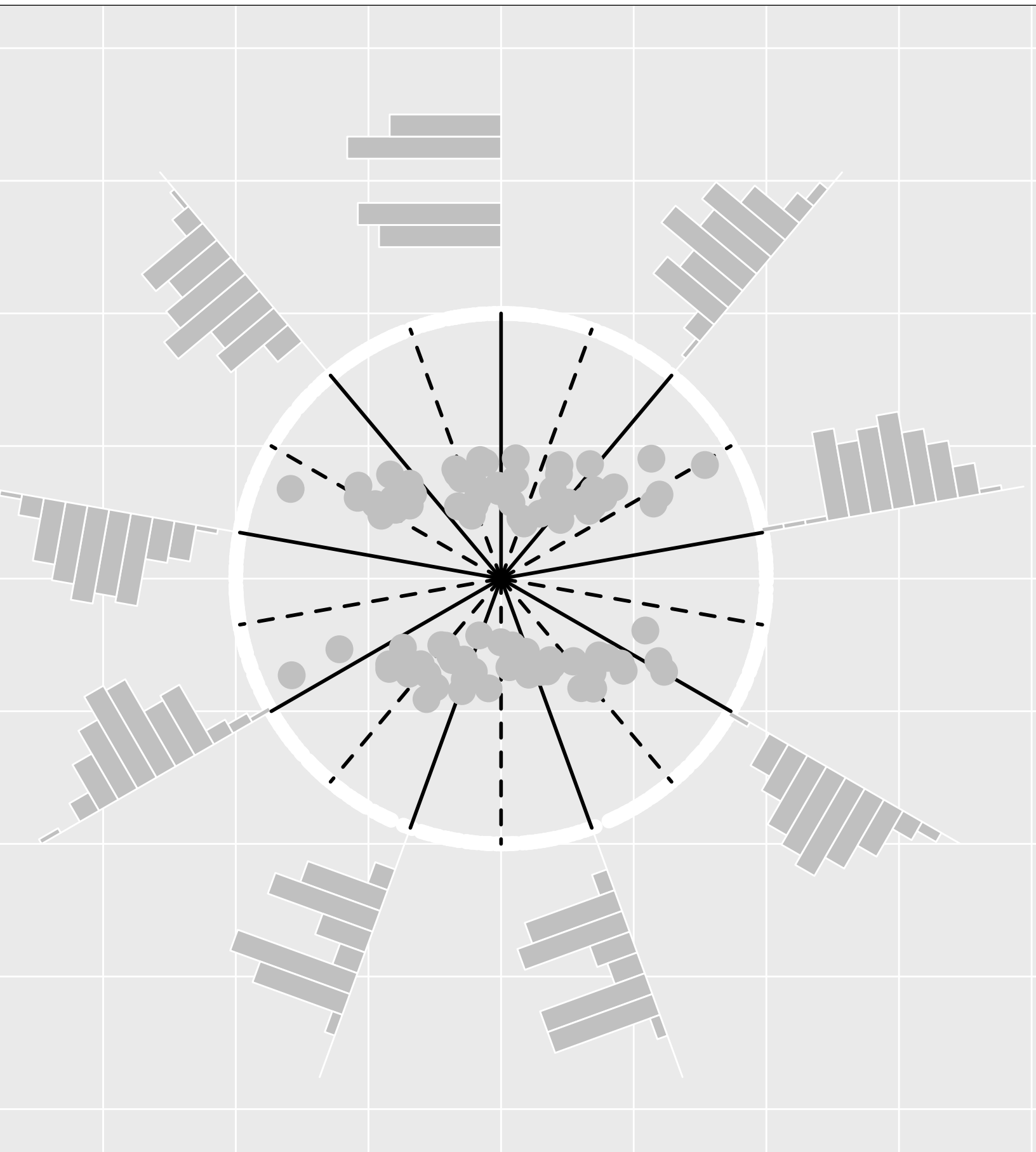
types

1d: density, histogram, ASH

2d: scatterplot, trails

3d: Anaglyphs, depth cueing

kd: Parallel coordinates, Andrew's curves
glyphs (stars, faces)



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