ML Week

0x08 Principle Component Analysis (PCA)

Jeff Abrahamson

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Motivation

Remember the Curse of Dimensionality?

Principle

- Linear transformations have axes
- Find them (eigenvectors)
- Pick the biggest ones

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Fitting an n-dimensional ellipsoid to the data

Uses

- Exploratory data analysis
- Compression

Also known as

- Discrete Kosambi-Karhunen–Loève transform (KLT) (signal processing)
- Hotelling transform (multivariate quality control)
- Proper orthogonal decomposition (POD) (ME)
- Singular value decomposition (SVD), Eigenvalue decomposition (EVD) (linear algebra)
- Etc.

History

- Invented by Karl Pearson in 1901
- Invented (again) and named by Harold Hotelling in 1930's
- Also known as. . .

Also known as

- It's a long list, every field uses a different name. . .

Eigenfaces

- Sirovich and Kirby (1987)
- Turk and Pentland (1991)

Turk, Matthew A and Pentland, Alex P. Face recognition using eigenfaces. Computer Vision and Pattern Recognition, 1991. Proceedings CVPR'91., IEEE Computer Society Conference on 1991.

Questions?

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