Intelligent Data Analysis: Clustering - motivation

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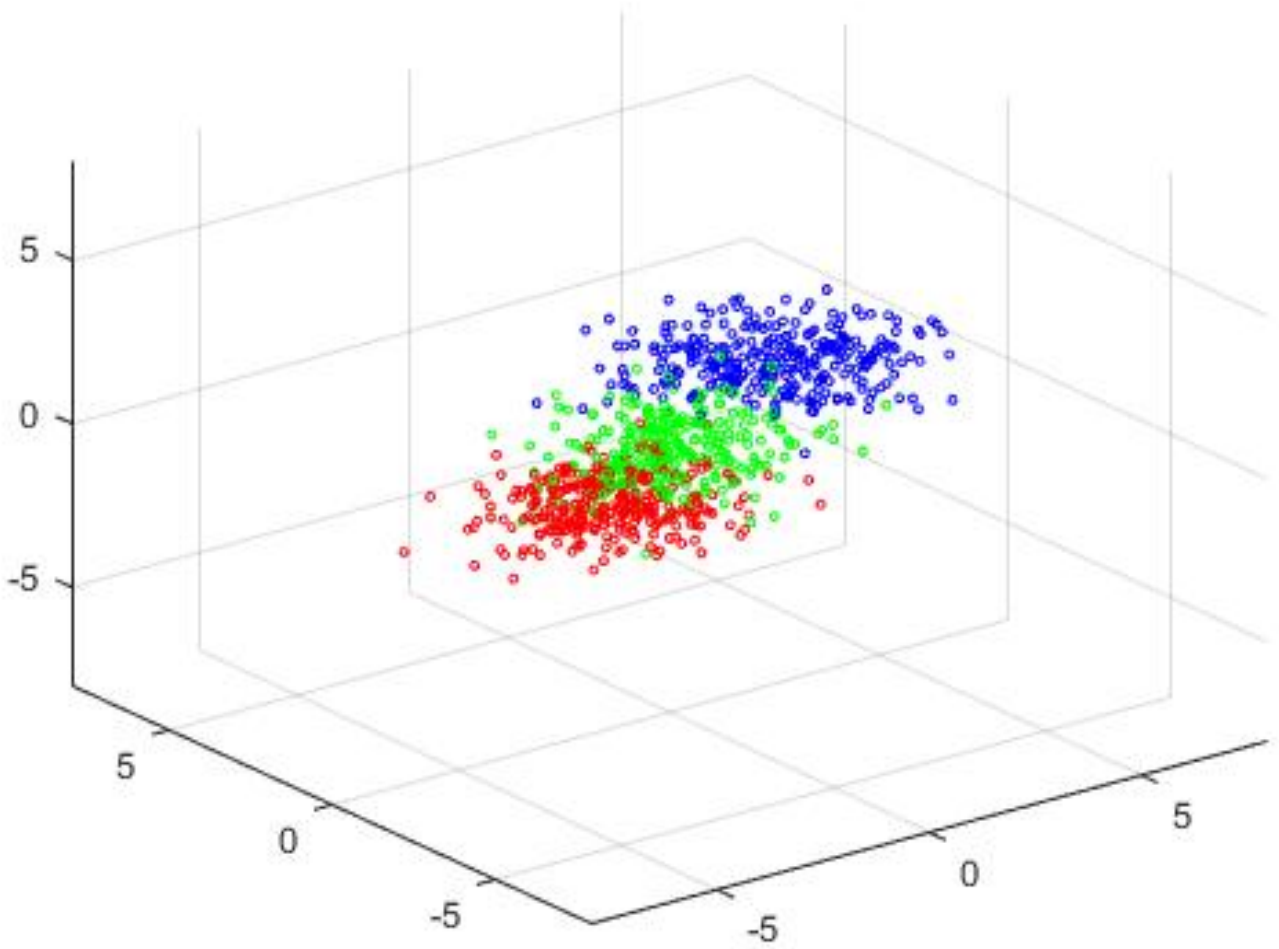
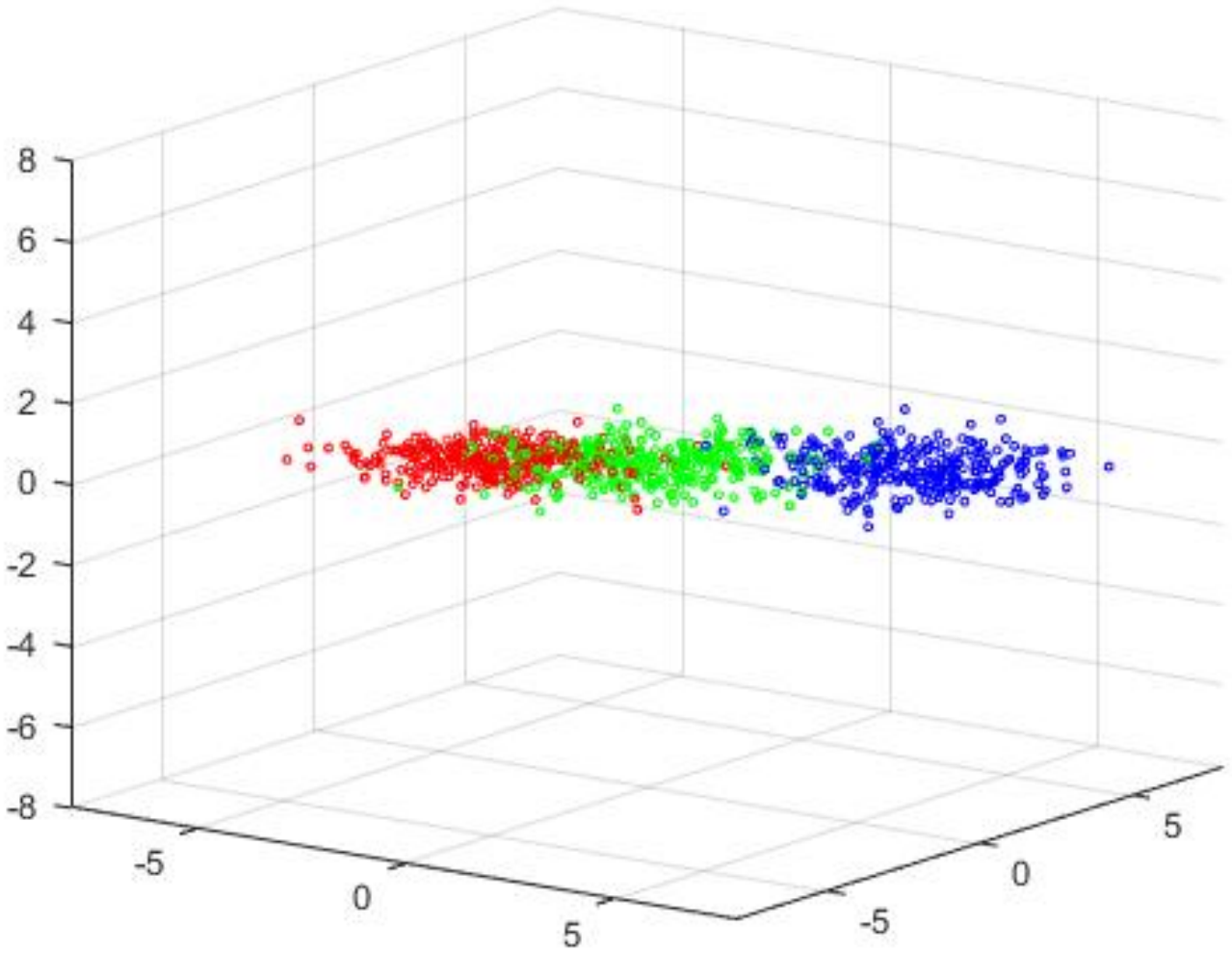
Overview

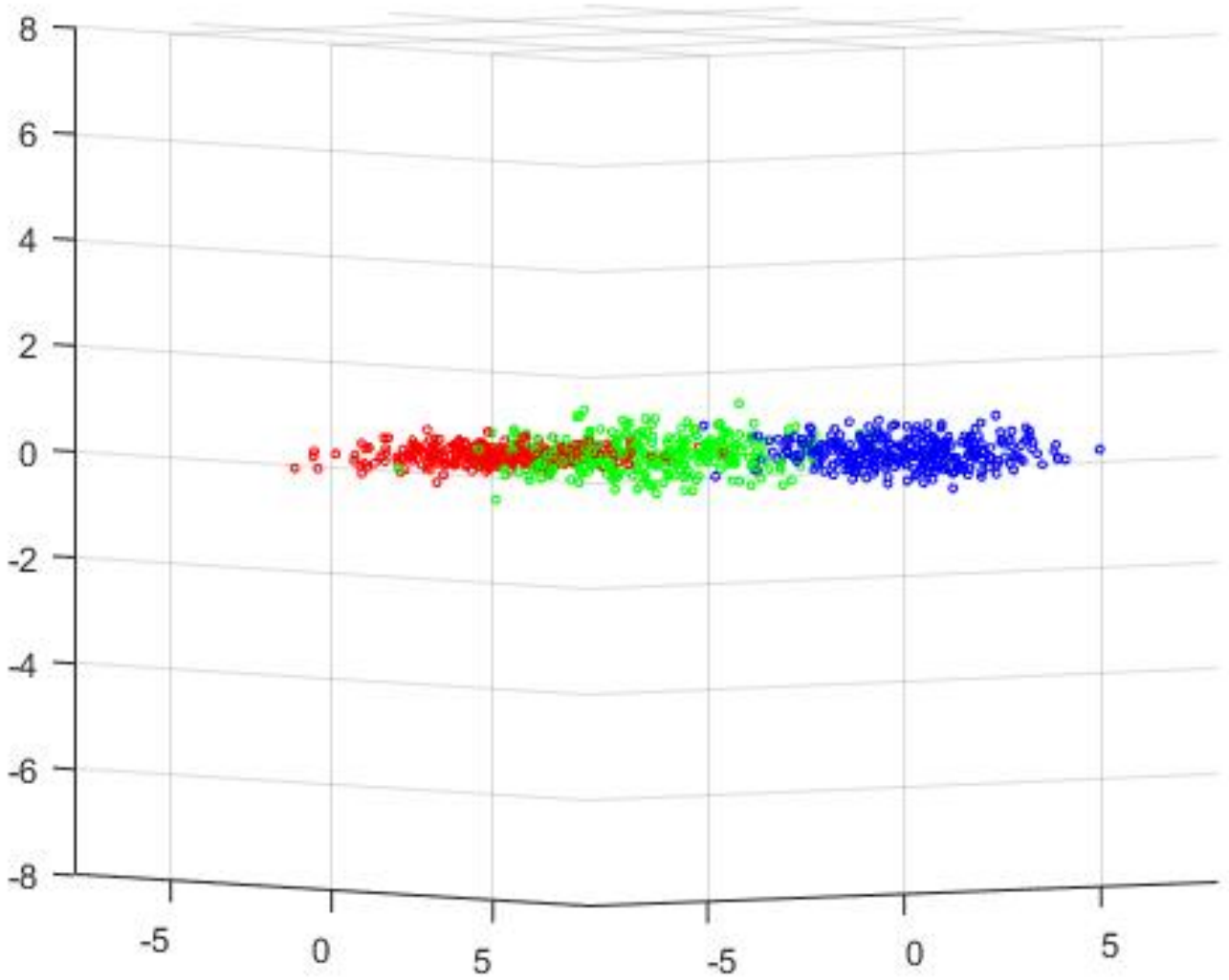
2-dimensional objects in 3D



2-dimensional objects in 3D



2-dimensional objects in 3D



Reminder - PCA analysis

- Data points stored as rows of a matrix X

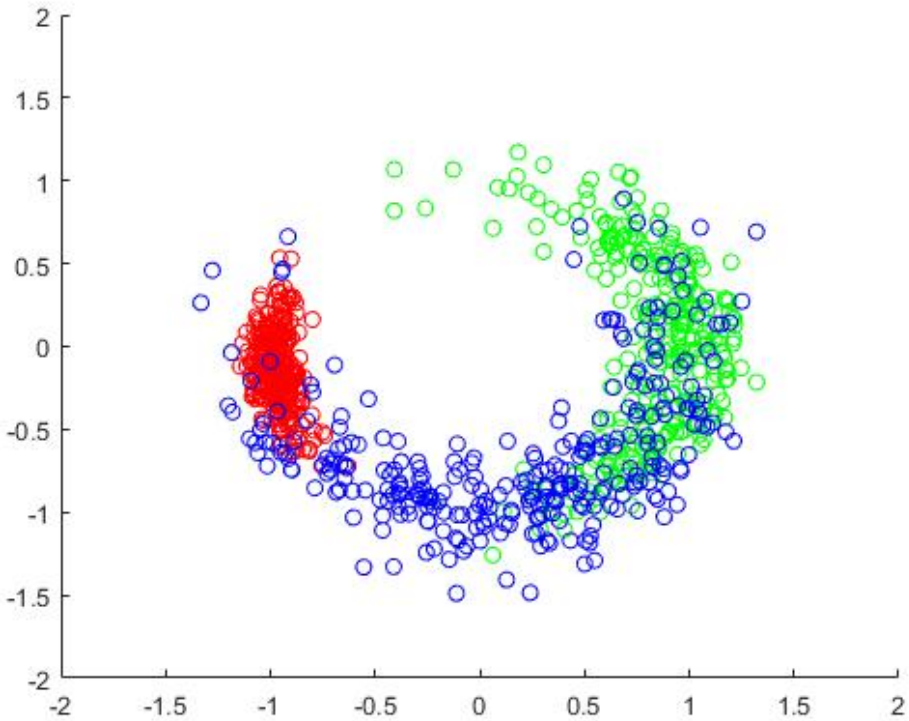
$$C = \frac{1}{N-1} X^T X \quad (1)$$

$$C = UDU^T \text{ (Eigenvalue decomposition)} \quad (2)$$

$$D = \begin{bmatrix} 0.06 & 0 & 0 \\ 0 & 1.51 & 0 \\ 0 & 0 & 13.61 \end{bmatrix}, \quad (3)$$

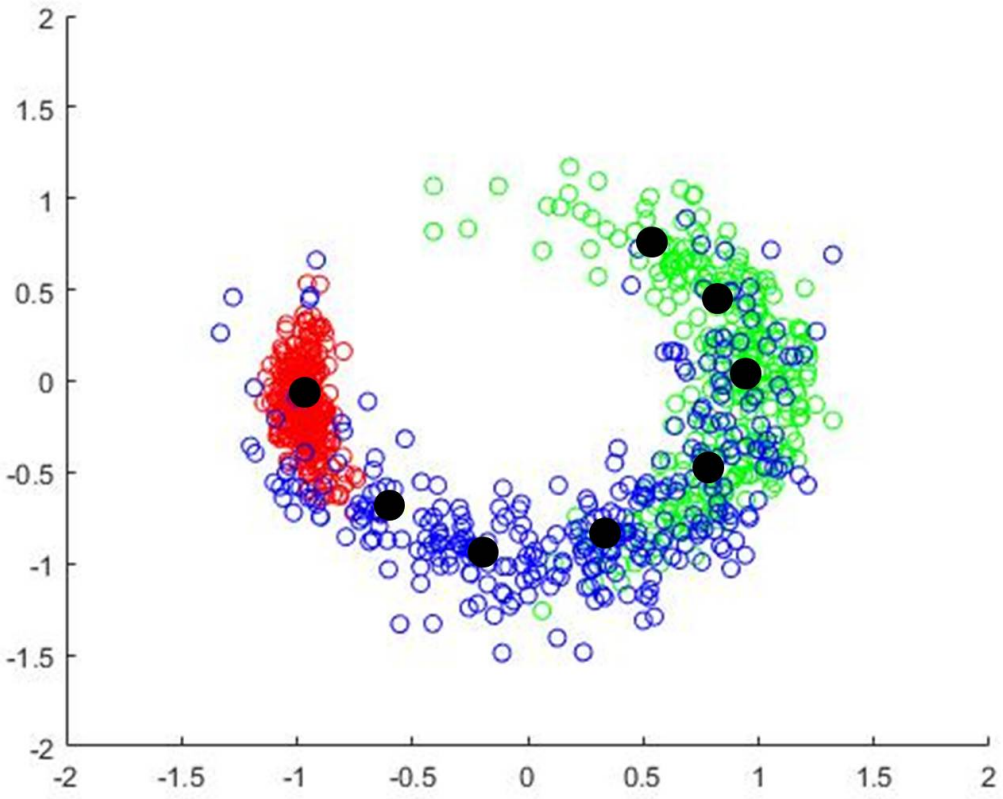
$$U = \begin{bmatrix} -0.004 & -0.505 & -0.863 \\ 0.004 & 0.863 & -0.505 \\ 1.0 & -0.006 & -0.001 \end{bmatrix} \quad (4)$$

1-dimensional objects in 3D



Non-linear embedding of "1-dimensional' object in 3 dimensions

1-dimensional objects in 3D



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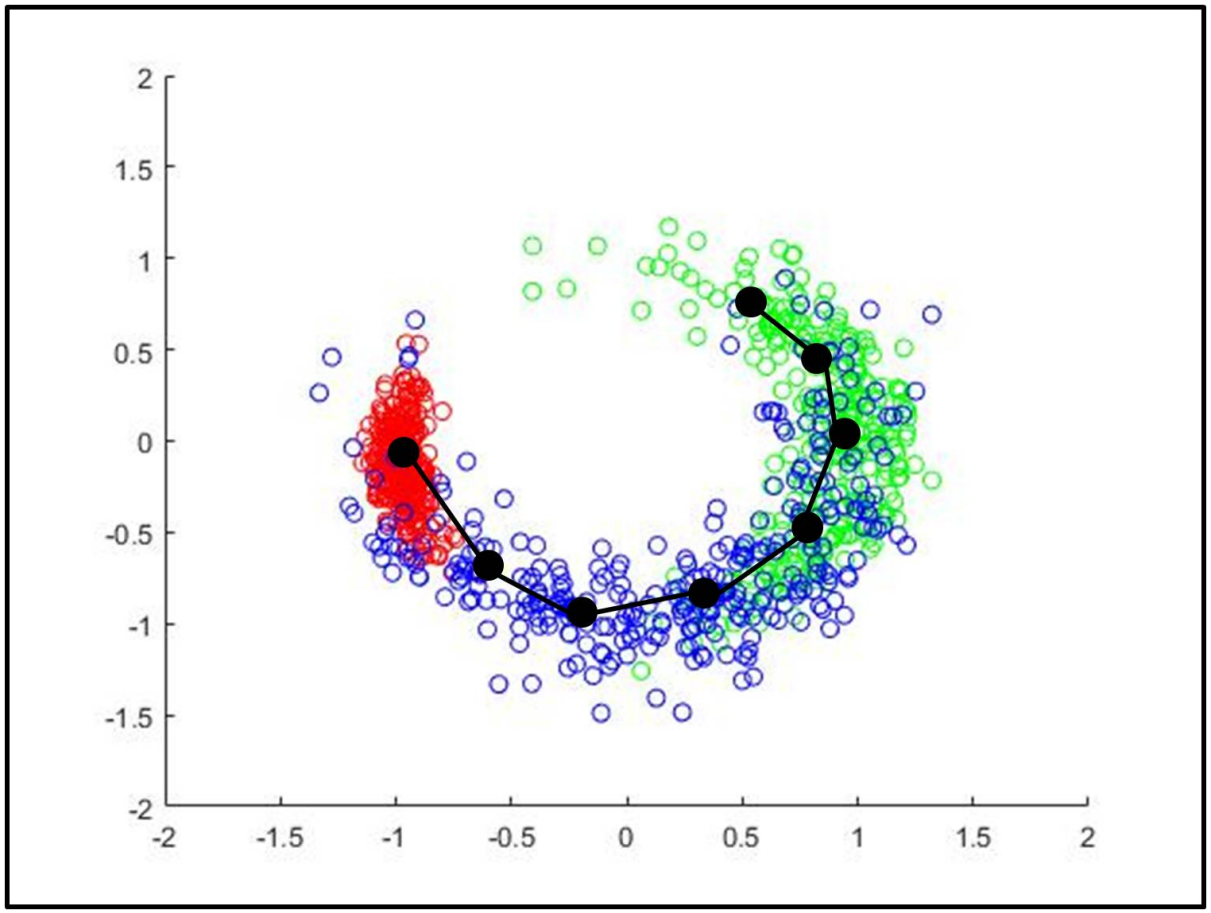

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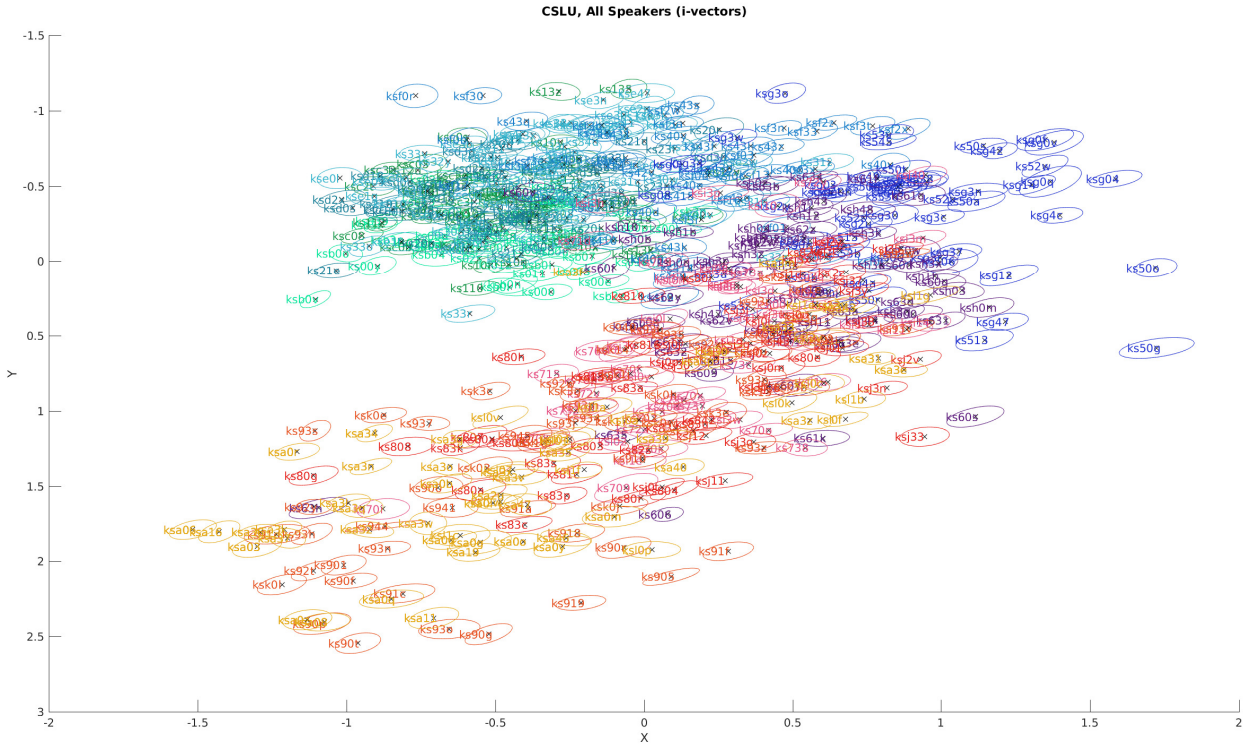
1-dimensional objects in 3D



i-vector representation of child speakers, colour-coded by age