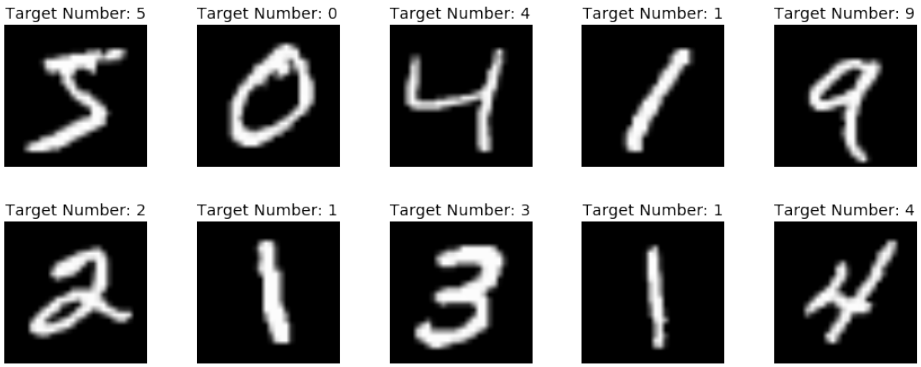
Intro Principle Component Analysis

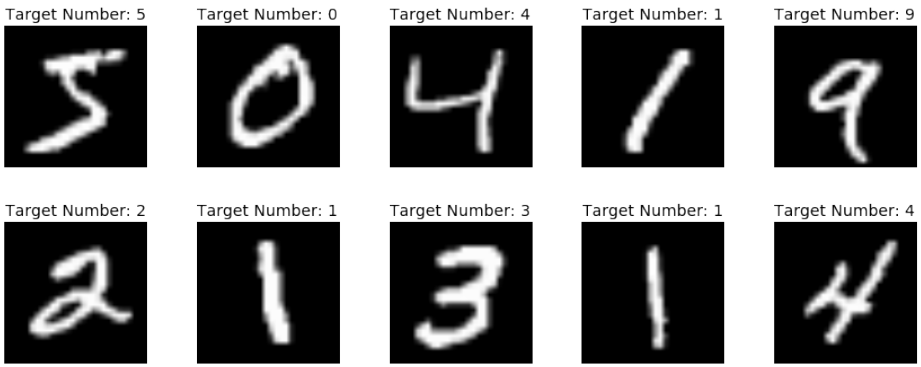
Frederik Mallmann-Trenn
6CCS3AIN

Let's say you want to recognise digits



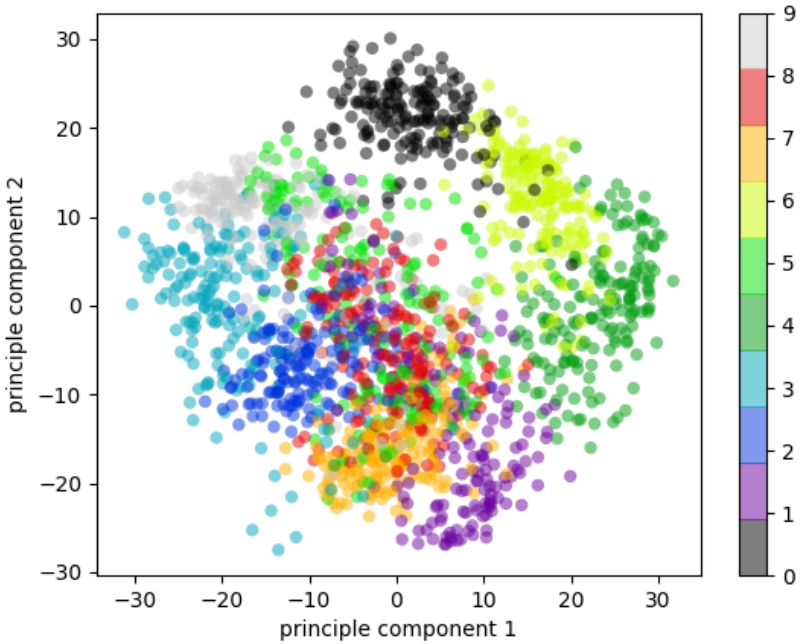
- MNIST: Very famous dataset from scikit-learn
- Let's say you want to use the large training set with examples (128x128 pixels)
- So that when I draw you a new digit, you can tell what it is! 

Let's say you want to recognise digits

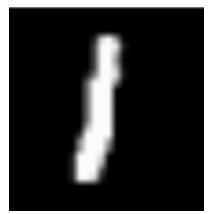


- Problem: Each digit has $128 \cdot 128 = 16,384$ features/dimensions
- Is there a nice way to reduce the number of features/dimensions?

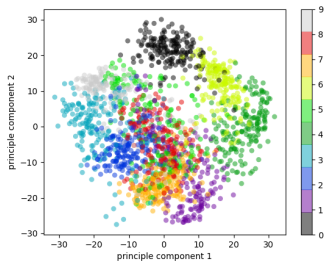
A cool way of doing this



- We try to find the two components (each is a combination of the features)



PCA



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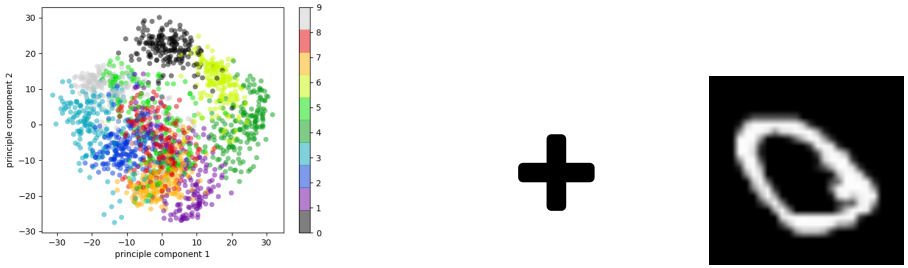

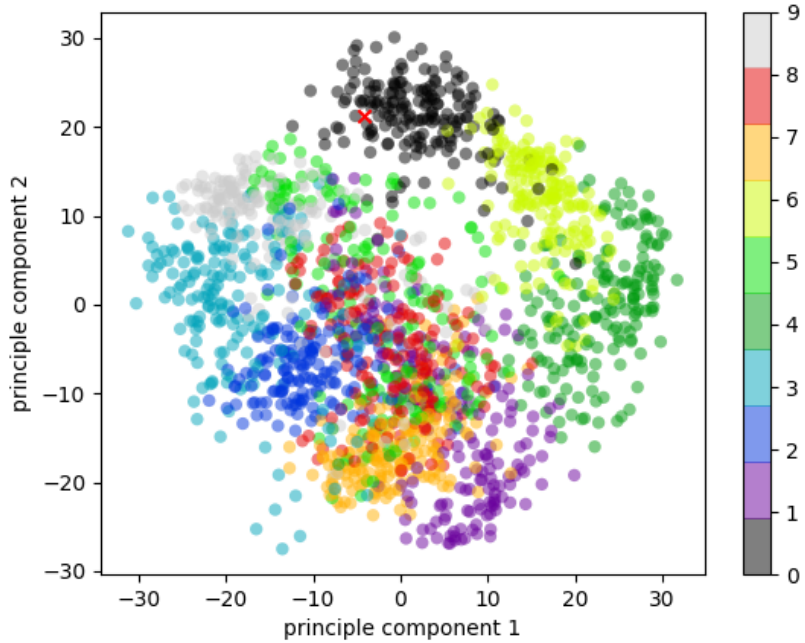

- Red cross is new input
- Easy to figure out where it belongs to..

PCA / SVD

Advantages

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Small disclaimer: PCA and SVD (Singular value decomposition) are slightly different, but very very similar, we'll look at PCA (which often uses SVD)