Goal: Automatically identify sub-types of type Ia supernovae

Challenges:
1. Not enough spectra at maximum
2. Highly non-linear problem
3. Validation of unsupervised clustering

Strategies:
1. Transfer Learning
2. Deep Learning
3. Compare with human classification

2. Deep Learning for dimensionality reduction
Layers: (120,100,90,50,30,20,4,20,30,50,90,100,120)

- Use spectra in all epochs to perform the dimensionality reduction.
- Afterwards, separate spectra at maximum for subsequent analysis

3. Comparison with human class.

Final remarks
We were able to automatically identify groups which are very similar to the ones found in the literature.

This type of algorithm can be used in future studies to guide theoretical modeling with insights taken from the data, but this will require a large, high quality data set.

This work is a product of COIN Residence Program #2, held in Isle of Wight, UK, in October 2015 and sponsored by Jason McEwen (Mullard Space Science Laboratory, UCL) and Alan Heavens (Imperial College London).

All tools used in this work are publicly available on github – QR code below.