# Restricted-Set-Classification

MATLAB code for simultaneous classification of a set objects when there are label restrictions

### What is restricted set classification?

[More can be found here](https://lucykuncheva.co.uk/other\_research/full\_class\_set.html)

Have you ever wondered how a team filming a documentary about a group of wild animals recognise each individual animal in the group? The animals are so alike that it is nearly impossible to tell them apart! An automatic classifier will likely make a lot of mistakes. But if you try to recognise the animals from a single photo, you have extra information! There can only be one of each in the group. In other words, if your classifier returns two Georges, you know that it is wrong. Can we improve the accuracy by taking the extra information on board?

Given is a set of objects \_S\_, each coming from one of \_c\_ classes. Each object has been classified already, and the classifier returns estimates of the posterior probabilities \_P\_ ( object | class 1 ), ... \_P\_ ( object | class \_c\_ ) . The MATLAB code calculates a label for each individual object under the restriction that there are at most \_k\_(\_i\_) objects from class \_i\_.

### Code

- `rsc.m` The restricted set classification function. Four methods are implemented to create a match between objects and labels:

- (1) The Hungarian algorithm,

- (2) A greedy algorithm,

- (3) Sampling from the distribution of the posterior probabilities, and

- (4) The Naive algorithm where the classifier labels each point based on the posterior probability and regardless of the restrictions.

- `assignment\_hungarian` A function that implement the Hungarian algorithm (Written by Alex Melin, 30 June 2006). This function is used within `rsc.m`.

- `TestRSC.m` A script that tests `rsc.m` on an example from the paper: Kuncheva L. I., J. J. Rodríguez and A. S. Jackson, Restricted Set Classification: Who is there?, Pattern Recognition, 63, 2017, 158–170. p. 161 [[pdf here]](https://lucykuncheva.co.uk/papers/lkjrajpr17.pdf)

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