

Spectral Image Analysis for Medical Imaging

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Overview of Project - What am I doing?

- ▶ Investigating use of *spectral images* for medical imaging.
- ▶ An image becomes a *data cube* $I(x, y, \lambda)$. (E.g. $\lambda \in \{R, G, B\}$).
- ▶ Aim to provide a pixel labelling/image segmentation for medical images using spectral information.
- ▶ We will use machine learning.
- ▶ Two approaches: Neural Nets, Random Forests.

Random Forests

DecisionForests

- ▶ Forest = set of trees.
- ▶ Trees 'vote' towards a winning class.

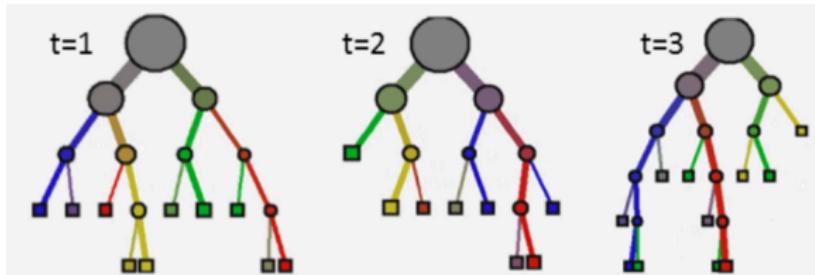


Figure:

Random Forests

The random bit

- ▶ Use *weak learners* to split the training sequence up.
- ▶ Want the split that leads to the optimal *information gain*.
- ▶ Can't possibly try every way of splitting.

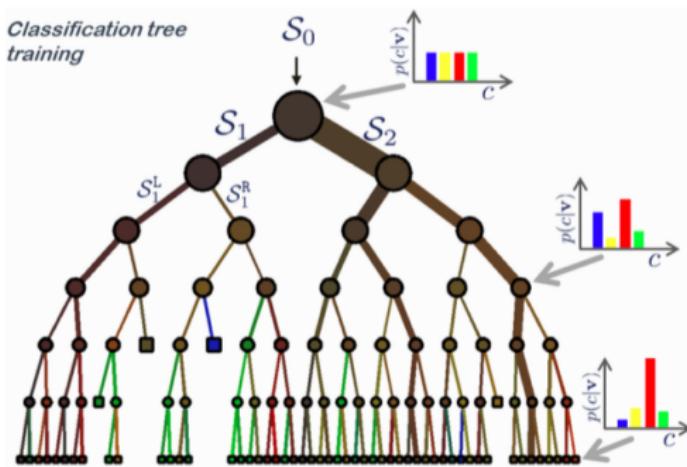


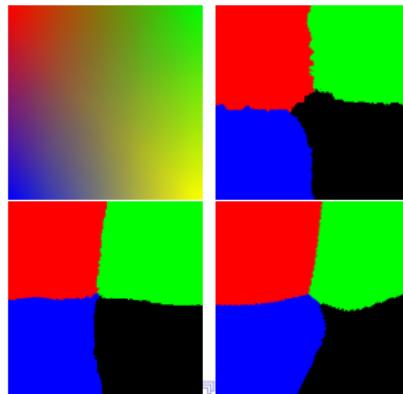
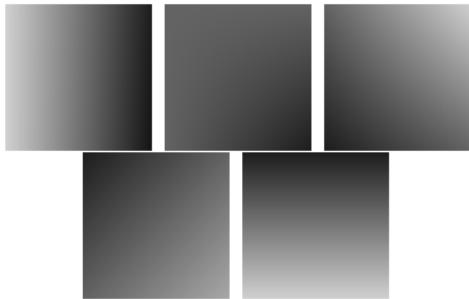
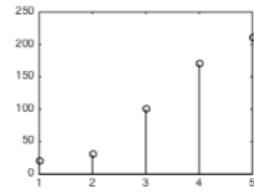
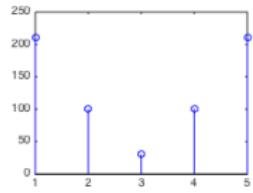
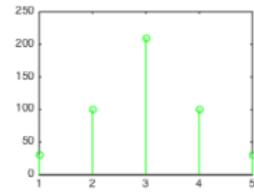
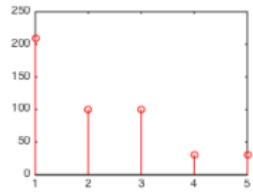
Figure:

Progress

Completed

- ▶ Random forests library.
- ▶ 'DataCube' interface.
- ▶ Pixel labelling using random forests,
- ▶ and using Encog. (A machine learning library in Java with Neural Nets).

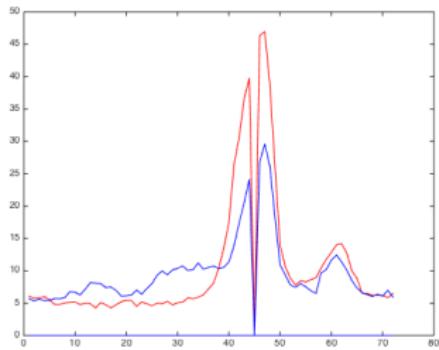
Progress



What's next?

- ▶ De noising images with Poisson noise.
- ▶ Get it working on some real images.
- ▶ Compare the implementations on how they perform (speed and accuracy).

What's next?



References