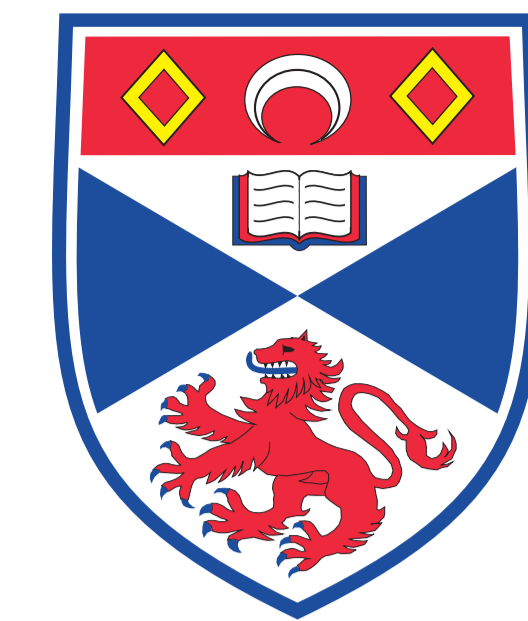
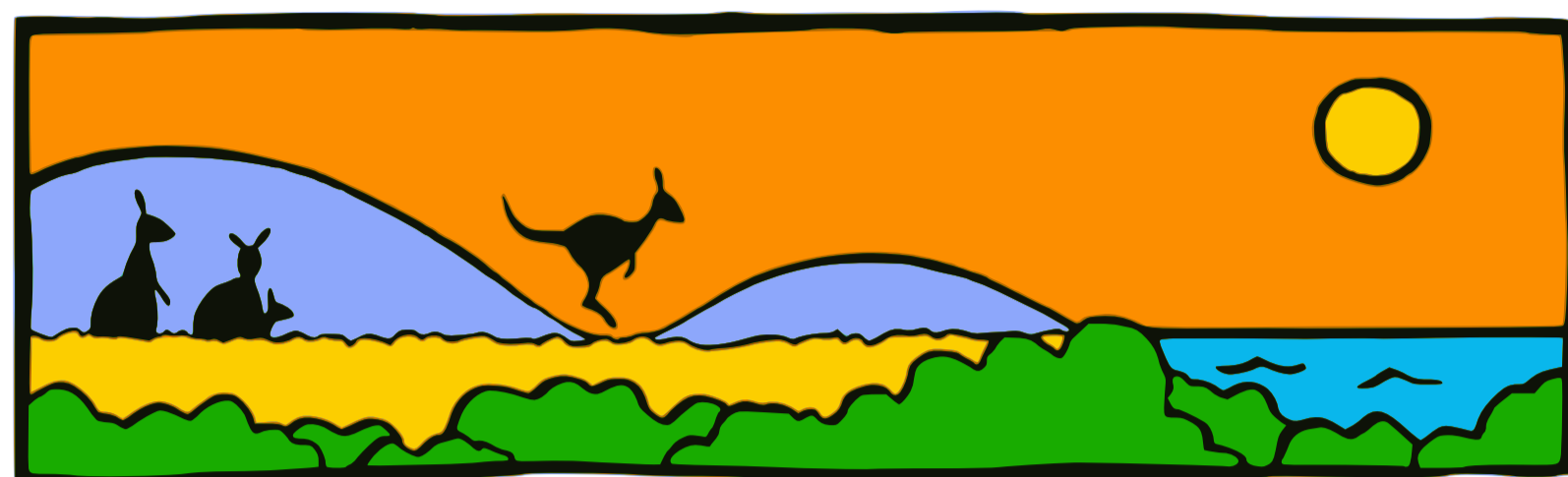


MLSS 2010 Machine Learning for the Canberra Algorithm Selection Problem



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Algorithm Selection Problem

- ▶ given a set of problems and algorithms, select the algorithm with the best performance for each problem
- ▶ not all algorithms applicable for all problems
- ▶ performance may be affected by external factors

Problem Space

selection mapping

- ▶ for most applications we can choose a sensible default
- ▶ want to catch the (few) cases where the default has bad performance
- ▶ focus on problems and algorithms where there are large differences in performance

Algorithm Space

performance mapping

Machine Learning

- ▶ for satisfiability problems (SAT), run time of individual algorithms can be predicted reliably → **Regression**
- ▶ for more complex problems (e.g. constraint problems), we can only decide which algorithm is likely to be better → **Classification**
- ▶ Which Machine Learning algorithms are most suitable?
- ▶ How should those algorithms be tuned?
- ▶ How to bias towards the problems and algorithms we care about most?
- ▶ How to determine the most predictive features?

Performance Space