Search Algorithms

- Level-wise search algorithm, which returns the global optimal solution, but only feasible for less than 40 variables.

  Note that the penalty is the same for models with the same size. So

  1. first find the model with the smallest RSS among all models of size m, where $m = 1, 2, \ldots, p$.

  2. Then evaluate the score on the p candidate models and report the optimal one.

- Greedy algorithms: fast, but only return a local optimal solution (which might be good enough in practice).

  – Backward: start with the full model and sequentially delete predictors until the score does not improve.

  – Forward: start with the null model and sequentially add predictors until the score does not improve.

  – Stepwise: consider both deleting and adding one predictor at each stage.

  What if $p > n$?