# Definition of the Custom TPOT2 Objective

We used a three-term multi-objective function in TPOT2. For each individual pipeline p, the objectives are:  
  
f(p) = (ROC AUC(p; X\_val, y\_val), NS(p), -Complexity(p) )  
  
ROC AUC: Area under the ROC curve computed on the validation set (X\_val, y\_val)

NS (Network Score): score for the selected feature subset. The value is imported from precomputed score document.

Complexity: computed using TPOT2’s built-in complexity\_scorer, which measures pipeline size and operator count. Since we specify scorers\_weights=[-1], this term is penalized, meaning simpler pipelines are preferred given equal ROC AUC and NS.

TPOT2 simultaneously maximizes ROC AUC and GS while minimizing complexity via Pareto optimization.

During optimization, each candidate pipeline is fit on the training set and evaluated on the validation set, returning ROC AUC, NS, and Complexity. Best pipeline is evaluated on test set (ROC AUC).