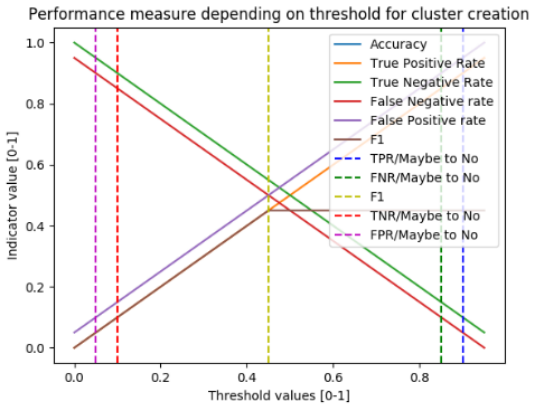


Ground truth graph
(used under his cluster format)

For each threshold of the extract server graph

Extracted from server graph

Graph formatted as clusters (with threshold)

## Performance datastructure

Threshold

0.42

### Statistics datastructure

**condition positive (P)**
the number of real positive cases in the data
**condition negative (N)**
the number of real negative cases in the data

**true positive (TP)**
eqv. with hit
**true negative (TN)**
eqv. with correct rejection
**false positive (FP)**
eqv. with false alarm, Type I error
**false negative (FN)**
eqv. with miss, Type II error

**sensitivity, recall, hit rate, or true positive rate (TPR)**

$$\mathrm{TPR} = \frac{\mathrm{TP}}{\mathrm{P}} = \frac{\mathrm{TP}}{\mathrm{TP}+\mathrm{FN}} = 1 - \mathrm{FNR}$$

**specificity, selectivity or true negative rate (TNR)**

$$\mathrm{TNR} = \frac{\mathrm{TN}}{\mathrm{N}} = \frac{\mathrm{TN}}{\mathrm{TN}+\mathrm{FP}} = 1 - \mathrm{FPR}$$

**precision or positive predictive value (PPV)**

$$\mathrm{PPV} = \frac{\mathrm{TP}}{\mathrm{TP}+\mathrm{FP}} = 1 - \mathrm{FDR}$$

**negative predictive value (NPV)**

$$\mathrm{NPV} = \frac{\mathrm{TN}}{\mathrm{TN}+\mathrm{FN}} = 1 - \mathrm{FOR}$$

**miss rate or false negative rate (FNR)**

$$\mathrm{FNR} = \frac{\mathrm{FN}}{\mathrm{P}} = \frac{\mathrm{FN}}{\mathrm{FN}+\mathrm{TP}} = 1 - \mathrm{TPR}$$

**fall-out or false positive rate (FPR)**

$$\mathrm{FPR} = \frac{\mathrm{FP}}{\mathrm{N}} = \frac{\mathrm{FP}}{\mathrm{FP}+\mathrm{TN}} = 1 - \mathrm{TNR}$$

**false discovery rate (FDR)**

$$\mathrm{FDR} = \frac{\mathrm{FP}}{\mathrm{FP}+\mathrm{TP}} = 1 - \mathrm{PPV}$$

**false omission rate (FOR)**

$$\mathrm{FOR} = \frac{\mathrm{FN}}{\mathrm{FN}+\mathrm{TN}} = 1 - \mathrm{NPV}$$

**accuracy (ACC)**

$$\mathrm{ACC} = \frac{\mathrm{TP}+\mathrm{TN}}{\mathrm{P}+\mathrm{N}} = \frac{\mathrm{TP}+\mathrm{TN}}{\mathrm{TP}+\mathrm{TN}+\mathrm{FP}+\mathrm{FN}}$$

**F1 score**
is the harmonic mean of precision and sensitivity

$$\mathrm{F_1} = 2 \cdot \frac{\mathrm{PPV} \cdot \mathrm{TPR}}{\mathrm{PPV}+\mathrm{TPR}} = \frac{2\mathrm{TP}}{2\mathrm{TP}+\mathrm{FP}+\mathrm{FN}}$$

**Matthews correlation coefficient (MCC)**

$$\mathrm{MCC} = \frac{\mathrm{TP} \times \mathrm{TN} - \mathrm{FP} \times \mathrm{FN}}{\sqrt{(\mathrm{TP}+\mathrm{FP})(\mathrm{TP}+\mathrm{FN})(\mathrm{TN}+\mathrm{FP})(\mathrm{TN}+\mathrm{FN})}}$$

**Informedness or Bookmaker Informedness (BM)**

$$\mathrm{BM} = \mathrm{TPR} + \mathrm{TNR} - 1$$

**Markedness (MK)**

$$\mathrm{MK} = \mathrm{PPV} + \mathrm{NPV} - 1$$

*Sources: Fawcett (2006),[3] Powers (2011),[4] and Ting (2011)[5]*