Analysis of Dataset ♯1

Preliminary Report

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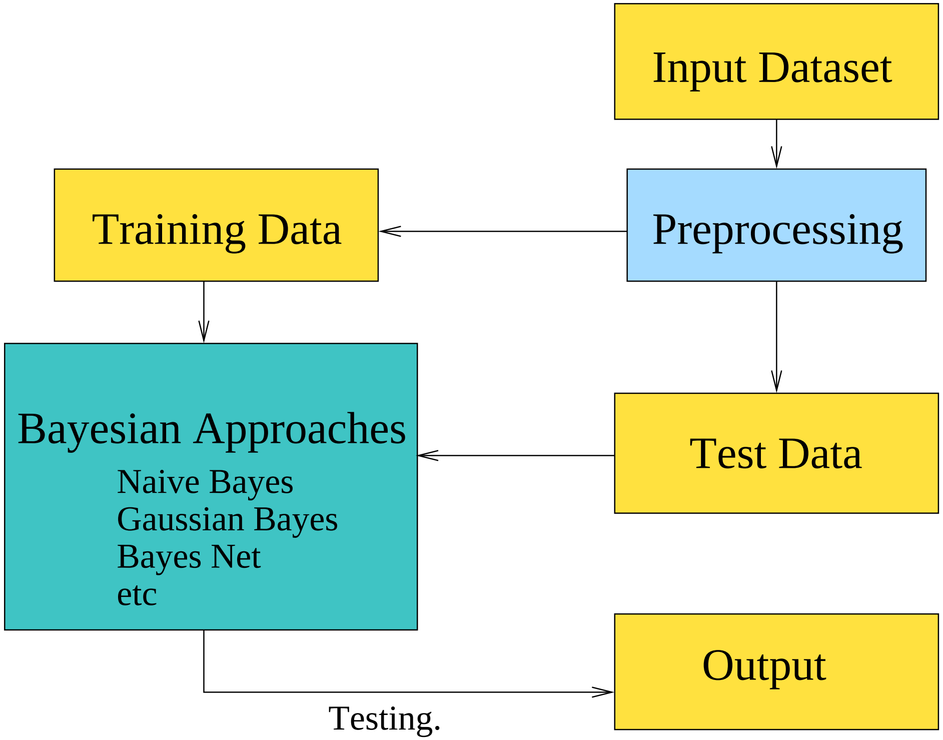
Testing Model

We use *Weka* to analysis the dataset with different Bayesian Approaches. The basic model is showed in the below figure.



Dataset Bases

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- 138 instances and 136 attributes.
- Class Variable: $Target \in 0, 1$.
- Six attributes are clearly just labels or counters $(Main\_Case, SAMPLE, AMGE, AMGN, Class, Regolith)$.
- All attributes are numeric, which need to be discretized into nominal.

Discretize and Attribute Selection

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  - *Evaluator*: Determines how attributes/attribute subsets are evaluated.
    - *CfsSubsetEval*: CFS attribute subset evaluator.
    - *ClassifierSubsetEval*: Classifier subset evaluator.
    - *InfoGainAttributeEval*: Evaluating attributes individually by measuring the information gain.

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  - *Search*: Determines the search method.
    - *BestFirst, GreedyStepwise, RandomSearch, ExhaustiveSearch* (intuitive).
    - *RaceSearch, Ranker, RankSearch* (unknown).

Selected Attributes

We apply different Evaluator and Search Method to get different attribute subset.

- *CfsSubsetEval* and *BestFirst*: 15 Attributes.
- *InfoGainAttributeEval* and *Ranker*: 12 Attributes (above 0.1000).
- *ClassifierSubsetEval-NaiveBayes* and *BestFirst*: 11 Attributes.

Detail information of the attribute subsets can be found on my page: *http://www.cs.queensu.ca/home/xiao/dm.html*.

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- *NaiveBayesUpdateable*: The updateable version of NaiveBayes.
- *BayesNets*: Bayes Network learning.
- *AODE*: Achieve highly accurate classification by averaging over all of a small space of alternative naive-Bayes-like models that have weaker (and hence less detrimental) independence assumptions than naive Bayes.

Preliminary Results - All Attributes

We use all attributes (except removed 6) for the mining first.

Bayes Method	*Correct Rate%*	*Incorrect Rate%*	*Build Time(s)*
NaiveBayes	68.0851	31.9149	0.02
NaiveSimple	68.0851	31.9149	0.08
NaiveUpdate	68.0851	31.9149	0.02
BayesNets	65.9574	34.0426	0.03
AODE	n/a	n/a	0.39

The training and testing splitting is default at 66%.

Preliminary Results - 15 Attributes

We use selected attributes from the *CfsSubsetEval* and *BestFirst*.

Bayes Method	*Correct Rate%*	*Incorrect Rate%*	*Build Time(s)*
NaiveBayes	80.8511	19.1489	0
NaiveSimple	80.8511	19.1489	0
NaiveUpdate	80.8511	19.1489	0
BayesNets	80.8511	19.1489	0
AODE	78.7234	21.2766	0

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Preliminary Results - 12 Attributes

We use selected attributes from the *InfoGainAttributeEval* and *Ranker*.

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AODE	78.7234	21.2766	0.03

The training and testing splitting is default at 66%.

Preliminary Results - 11 Attributes

We use selected attributes from the *ClassifierSubsetEval-NaiveBayes* and *BestFirst*.

Bayes Method	*Correct Rate%*	*Incorrect Rate%*	*Build Time(s)*
NaiveBayes	80.8511	19.1489	0
NaiveSimple	80.8511	19.1489	0
NaiveUpdate	80.8511	19.1489	0
BayesNets	87.2340	12.7660	0.03
AODE	80.8511	19.1489	0

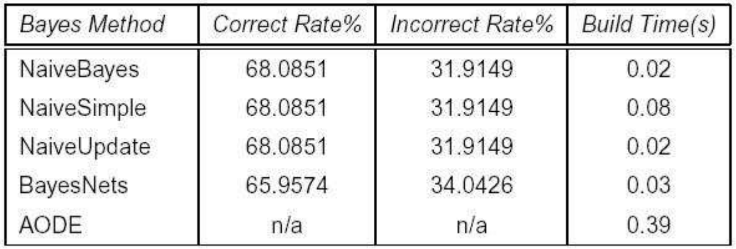
The training and testing splitting is default at 66%.

Discussion

What we get from the preliminary play around.

- The attribute selection is important.
- The performance of different Bayes method varies.
- Inference model requires more data preprocessing.
- Weka needs DOCUMENTATION!

All Attributes



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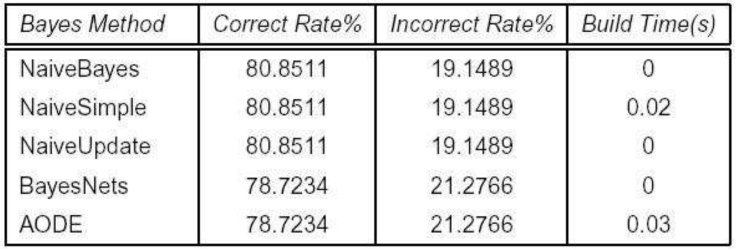

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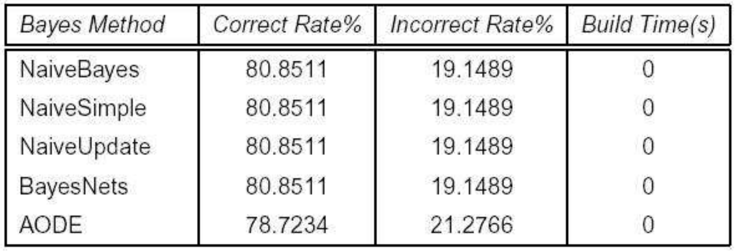

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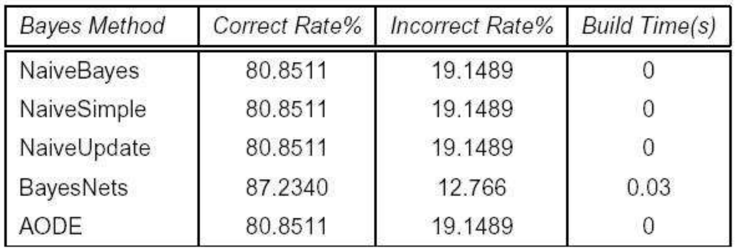

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Discussion

Some interesting points to be discussed.

- Overfitting? (AODE with 11 attributes - 88% correct with 82% training) BayesNet results listed table below.
- Discretize settings.
- Find a better attribute subset?

Training%	*Testing%*	*Correct Rate%*
66	34	87.2340
60	40	82.1429
75	25	85.7143
82	18	84.0000
90	10	78.5714

Ending

Questions regarding Analysis results?

Information Site: http://www.cs.queensu.ca/home/xiao/dm.html

E-mail: xiao@cs.queens.ca

Thank you