**H2O Algorithms Roadmap**

**0xdata**

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**Abstract:**

0xdata is bringing a breadth of Algorithms in H2O with the goal of being useful and relevant to our data science and algorithms users. Towards here’s our roadmap for high-scale and fast implementations of Math, Machine Learning and Statistical algorithms.

Also, data characteristics influence some or most of the algorithm implementations.

Sparse datasets, Unbalanced Asymmetric data and Streaming (Larger than memory) data make unique demands for each of the algorithms.

Finally, Advanced tooling that enables parameter search in a given algorithm makes it easy for Data Scientists to iterate a given algorithm for best figure of merit.

A summary list of Algorithms and Solvers that were hand picked from our early customer interactions.

Data Characteristics:

1. Sparse Datasets
2. Unbalanced Asymmetric
3. Streaming Data (Larger than Memory)

Simple “legos” of Statistics:

1. Summarization
2. Histograms, Percentiles
3. Univariate feature Filtering (t-Tests, ratios of t-Tests; f-test)
4. Logarithm transformation

**Regression & Classification:**

1. GLM, Generalized Linear Modeling [Completeness to be R replacement.]
   1. Backwards-forwards feature selection using BIC/AIC
   2. Text-book GLMNet
   3. Feature Generation, Variable Importance
   4. k-folds, test-trains
   5. Handling NAs.
   6. Multinomial Regression
2. PCA, Principal Components Analysis
3. Bayesian Regression
4. Hierarchical Bayes Regression
5. BUGS (<http://www.openbugs.info/Examples/Seeds.html>)
6. Support Vector Machine (SVM)

**Decision Trees:**

1. GBM, Gradient Boosting Machine
2. DRF, Distributed Random Forest

**Neural Networks**

1. Multi-Layer Perceptron
2. Auto-encoder
3. Restricted Boltzmann Machines

**Clustering:**

1. K-Means (DEMO), hclust() – Sparse Data.
2. K-Nearest-Neighbors
3. Locality Sensitive Hashing.
4. Dimensionality Reduction
5. Topic clustering / LDA
6. Singlular Value Decomposition(SVD)

**Markov Chains:**

1. Hidden Markov Models

**Time-Series: (TBD)**

1. ARIMA library(forecast) from R.
2. GARCH

**Solvers & Optimization**

1. ADMM Solver
2. L-BFGS (quasi-Newton method)
3. Ordinary Least-Squares Solver Method.
4. Stochastic Gradient Descent
5. MCMC [non-trivial]

**Data Munging:**

1. plyr
2. Integrated R Environment.

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