

Wrapping Up and Next Steps



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Overview

**Recall when its appropriate to use
Machine Learning**

**Recognize and differentiate between
the important types of Machine
Learning Problems**

Understand where to go from here



An alien observing
happenings on earth



Learn by Experience



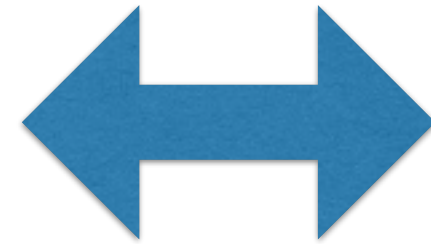
**The best way for this
alien to understand
what's going on earth**

Machine Learning

**A computer program/system
that can learn from
“Experience”**

Machine Learning

“Experience”



Data

Spam Detection

Predicting Sales

Recommendations

User Segmentation

**Learn patterns or
relationships from
data**

Typical ML Workflow

Pick your Problem

Identify which type of problem we need to solve

Represent Data

Represent data using numeric attributes

Apply an Algorithm

Use a standard algorithm to find a model

Typical ML Workflow

**Pick your
Problem**

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of problem we
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find a model

**Pick your
Problem**

Classification

Regression

Recommendations

Clustering

**Pick your
Problem**

**Each type of problem has
it's own basic workflow**

**Pick your
Problem**

Classification

**Classify something into a
pre-defined category**

**Pick your
Problem**

Regression

**Quantify relationships
between 2 sets of variables**

**Compute a continuous
value**

**Pick your
Problem**

Recommendations

**Recommend products that
the user might like**

**Pick your
Problem**

Clustering

**Find meaningful groups/
themes hidden in a large
data set**

Typical ML Workflow

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Represent Data

Classification

**Use attributes of the
instance to be classified**

Represent Data

Regression

Use variables that might be related to or influence the output

Represent Data

Recommendations

User ID, Product ID, Rating

Implicit/Explicit Ratings

Represent Data

Clustering

Use attributes to represent the objects to be grouped

- Attributes are chosen based on the insights you are looking for

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**Apply an
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Classification

Naive Bayes
Support Vector Machines
Tree based models
Logistic Regression

**Apply an
Algorithm**

Regression

Linear Regression
Non-Linear Regression

**Apply an
Algorithm**

Recommendations

Collaborative Filtering
Alternating Least Squares
Nearest Neighbor Model

Association Rules
Content Based Filtering

**Apply an
Algorithm**

Clustering

K-Means

**Hierarchical
Density Based
Distribution Based**

What's Next?

Typical ML Workflow



**We've covered
this in detail**

Typical ML Workflow



Represent Data

Data Munging

Feature extraction

Dimensionality Reduction

Feature Engineering

Data Munging

Most data requires heavy duty pre-processing

**Identifying and
accounting for
missing values**

**Recognizing and
fixing corrupt data**

Python, Spark, R

Feature Extraction

Data is often

- **Unstructured**
- **Semantically complex**
- **In different forms (Images, Videos, Text)**

Natural Language Processing

Image and Video Processing

Dimensionality Reduction

Many a time you end up with 100's or
1000's of features

Computing Complexity Explosion

Principal Components Analysis

Feature Selection Techniques

Feature Engineering

**This is an informal field -
somewhat of a black art**

**Constructing more relevant
features from a raw set of features**

Represent Data

Data Munging

Feature extraction

Dimensionality Reduction

Feature Engineering

Typical ML Workflow

**Pick your
Problem**

Represent Data

**Apply an
Algorithm**



**Apply an
Algorithm**

**Choosing an
algorithm**

**Model Selection
Techniques**

Model Selection

Given the type of problem

**10s of choices for the
algorithm to solve it**

Model Selection

Once you choose an algorithm

Each algorithm might have
several parameters that you
can tweak

Model Selection

**Choosing the best
algorithm + parameters for
your specific problem**

Model Selection

Hyper Parameter Tuning

Cross Validation

Ensembling

Summary

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