Accumulating Scientific Knowledge On Legislative Outcomes

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Software Beyond Expectations™

Scientific Knowledge

A fact:

- *Acquired through the scientific method*
- *Tested rigorously and independently*
- *Peer reviewed and subsequent published*
- *Potential or actual error measured*
- *Acceptance from the scientific community.*

Black's Law Dictionary, 2nd Edition

Would you???

- *Climb a plane that was designed on the principle of "good intent"?*
- *Take medications?*
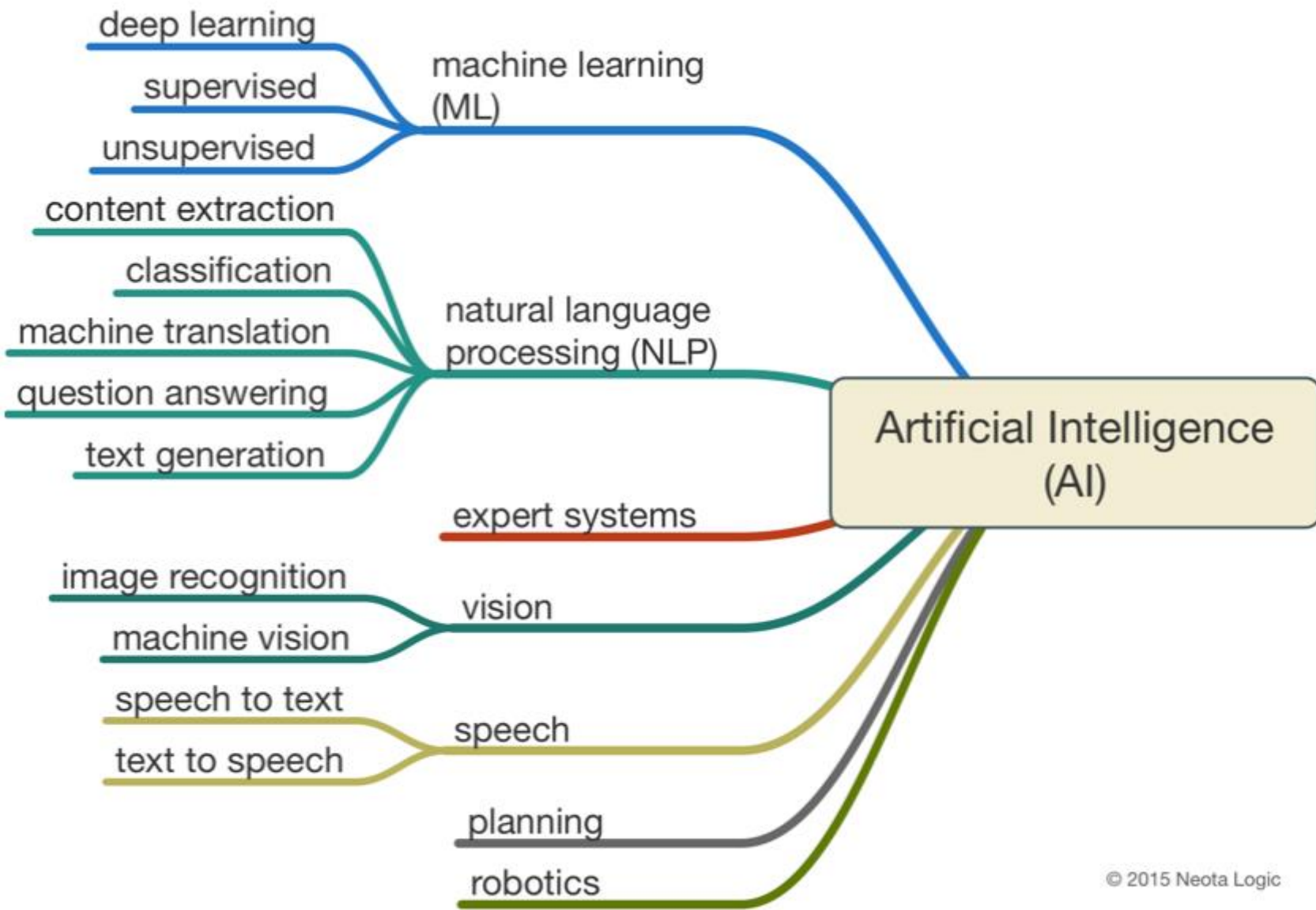- *Enjoy food?*
- *Allow surgery?*
- *Sky dive?*

Time to fill the void!

Automate or Vacate!

AI, ML, NLP, EIEIO!

deep learning
supervised
unsupervised
— machine learning (ML)

content extraction
classification
machine translation
question answering
text generation
— natural language processing (NLP)

expert systems

image recognition
machine vision
— vision

speech to text
text to speech
— speech

planning

robotics

Artificial Intelligence (AI)

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Planning & Process

General Approach:

STRATEGY	DATA COLLECTION	DATA PREPARATION	ALGORITHM SELECTION	HYPER-PARAMETERS	MODEL TRAINING	EVALUATION	DEPLOYMENT & PREDICTION
➡➡	➡➡	➡➡	➡➡	➡➡	➡➡	➡➡	➡➡

Steps 4 to 7 (sometimes including also step 3 and even step 2 if detected that the issue is in the data) are usually a loop which is repeated until achieving the required accuracy.

Planning & Process

Strategy Definition/Planning

Issue definition:

➢ Gather scientific articles describing effects/impact of laws

➢ Classify them to produce a large repository of information

Our target:

➢ Automatically capture/retrieve the data (import/scrap)

➢ Create a ML-Model to automatically classify those articles
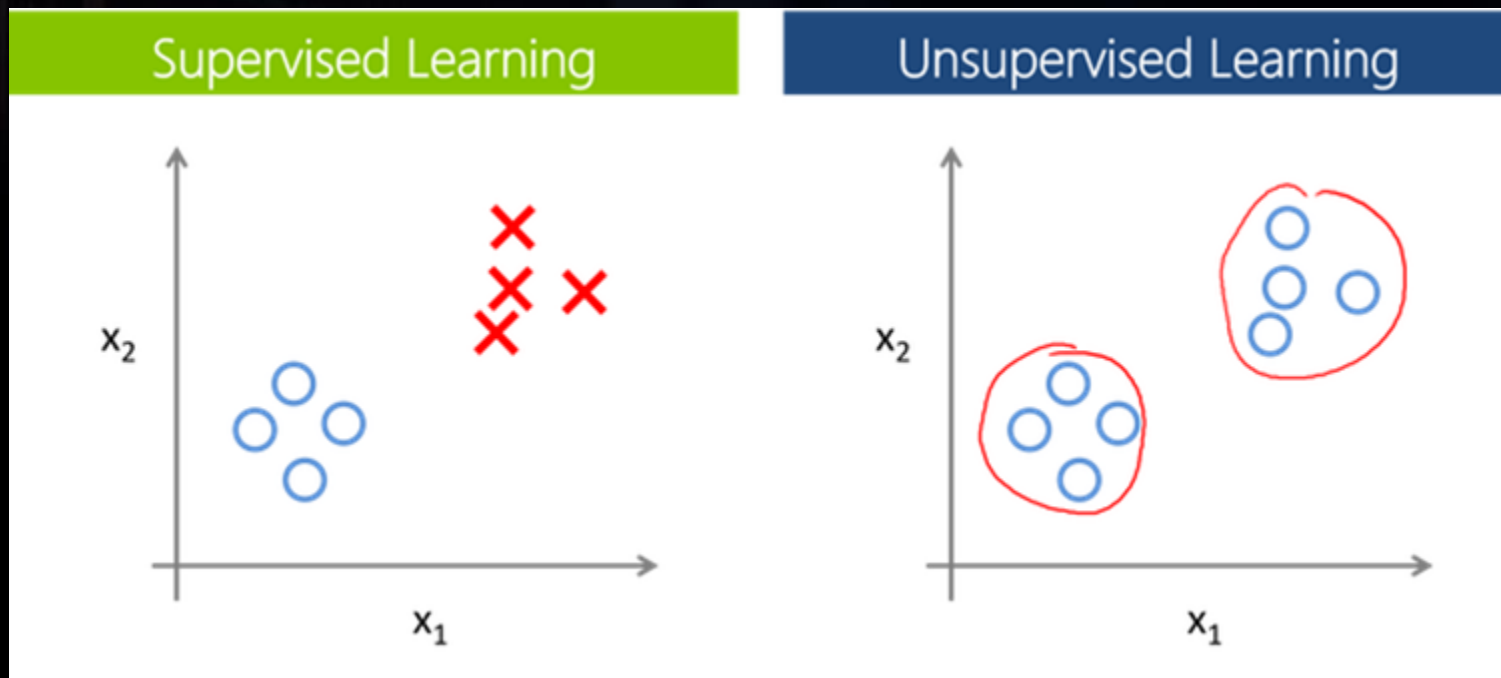
Planning & Process

Data Collection

Collect enough data to train the model

Planning & Process

Data Preparation and Preprocessing

➢ Eliminate duplicates and records with missing data

➢ Check data distribution

➢ Reshape the structure to feed the model
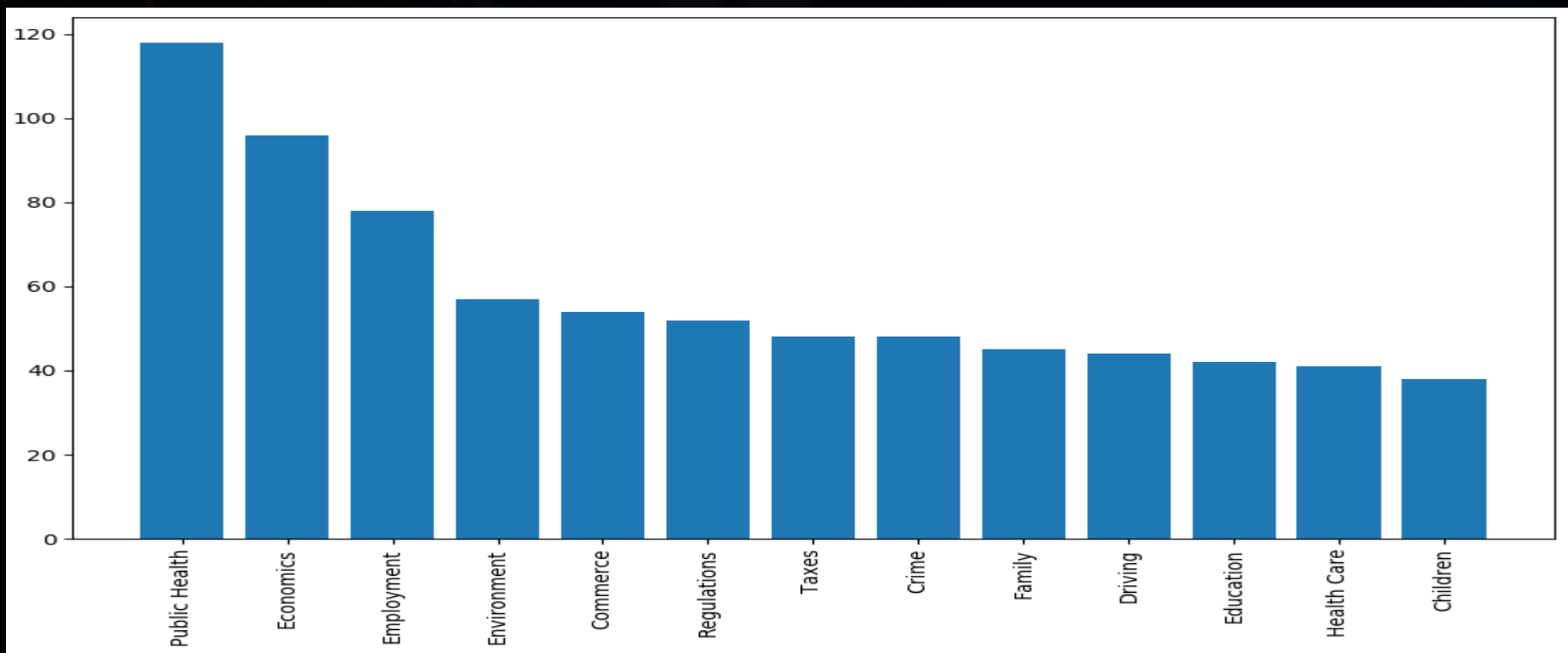
Planning & Process

Algorithm Selection

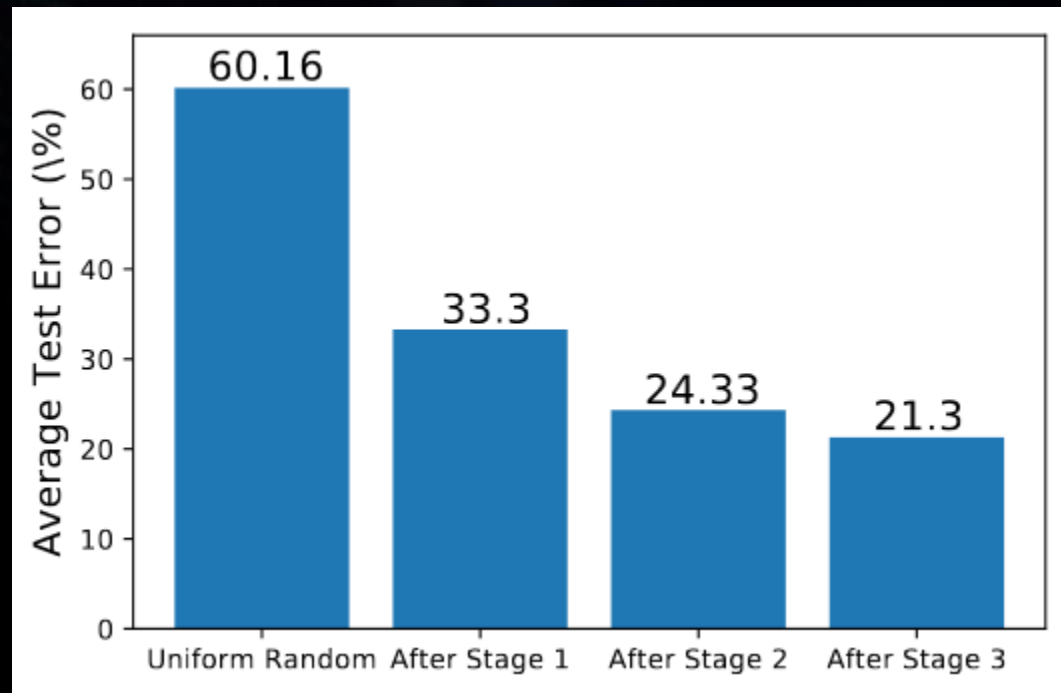Determine "best-fit" for data and target

Winner!!!

Planning & Process

Hyperparameter Tuning

Find the parameters that will lead to the best model accuracy for the given type of algorithm and data

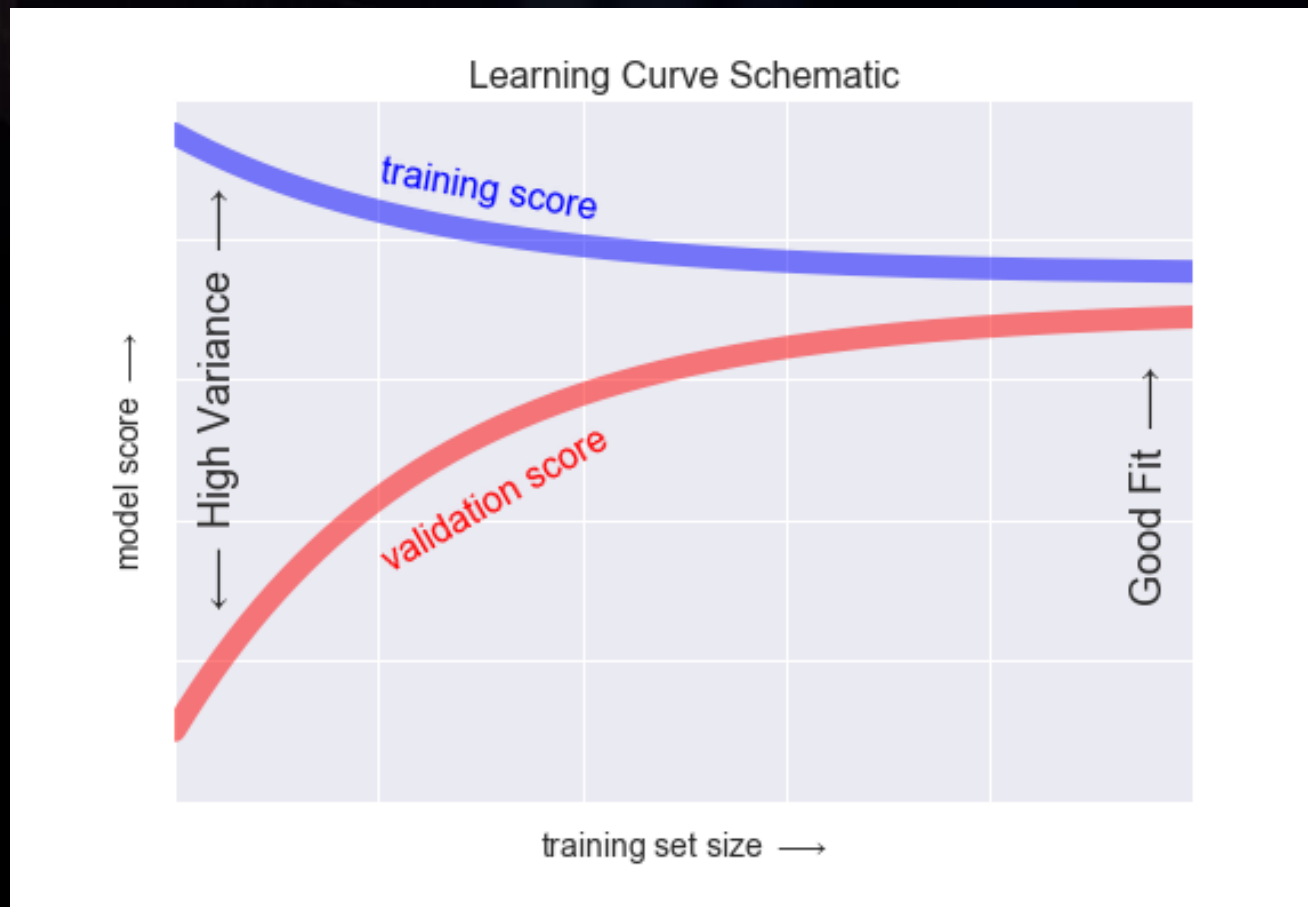# Planning & Process

Model Training

Feed the algorithm with data, parameters and hardware power to get a predictive function
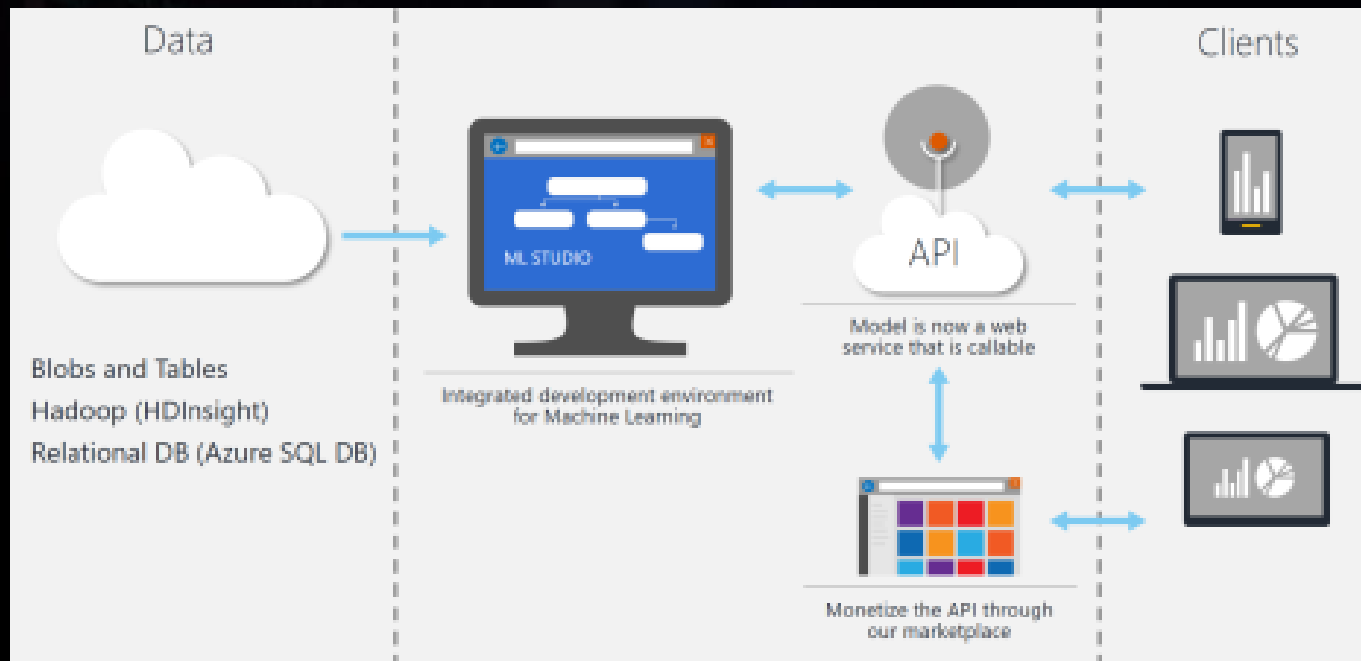
Planning & Process

Evaluation/Validation

Retain sample data for model accuracy self-check

Planning & Process

Deployment/Prediction

Once acceptable accuracy is achieved, the model is deployed as an API for other program use

What Have We Learned?

➢ Clean data is crucial to train a model... and a lot of it!

➢ Attempting to replace the lack of training-data for more iterations is likely to cause the model to "memorize" those training examples but will be inaccurate for anything new (overfitting)
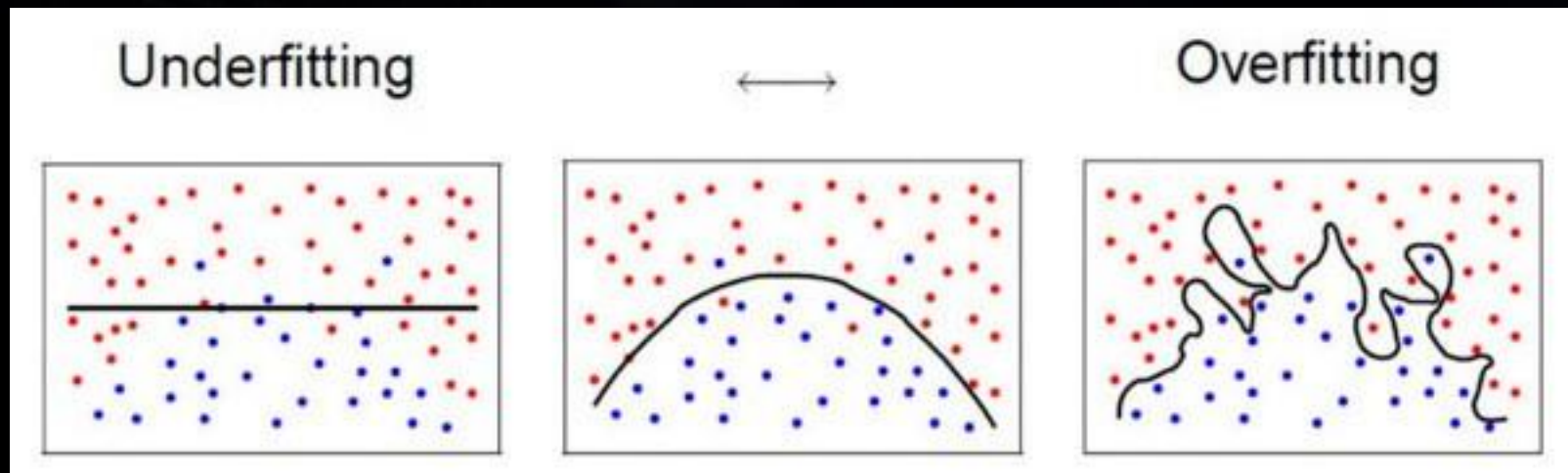
Source: www.celi.it/blog/

Next Steps

Expand Categorization & Sophistication

Once model is validated, the goal is to:

➢ Expand the list of categories

➢ Expand the list of article sources

➢ Enhance for multiple categorization per article

References

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Questions?

Thank You!

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