



Handwritten equations and diagram on a whiteboard:

$$M_b M_s M_r = \begin{pmatrix} Y & A & R \\ 1 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} b & 1 \\ 1 & 0 \end{pmatrix} = M_b M_r$$

$$\begin{pmatrix} b & 1 \\ 1 & 0 \end{pmatrix} = M_b M_r$$

Diagram showing a horizontal line with two vertical tick marks, labeled b below the line.

Lesson VI : Introduction to Machine Learning



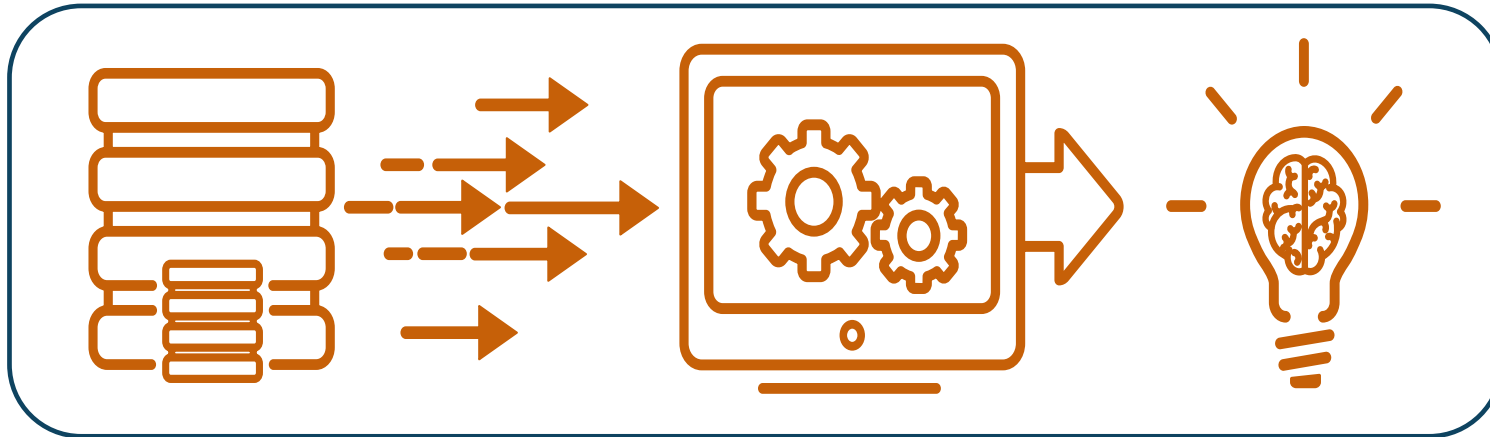
“

In the new world, it is not the big fish which eats the small fish, it's the fast fish which eats the slow fish.

”

Klaus Schwab
Founder and Executive Chairman
World Economic Forum

Machine Learning



Automate

Provide automation to the model-building process by minimizing human intervention.

Customize

Build powerful models using state-of-the-art algorithms from SAS in conjunction with open source tools.

Accelerate

Fast response time for sophisticated analytics applied to data of any size or complexity.

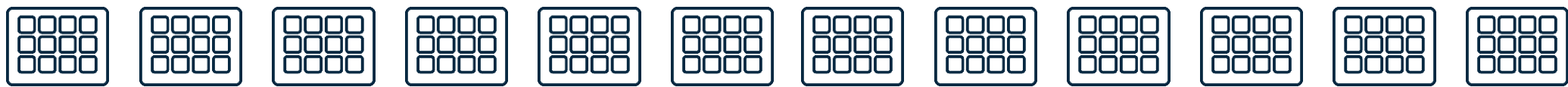
Today's Business Challenges

Fraud

Targeted
Marketing

Financial
Risk

Churn



Analitik Çalışma için İhtiyaçlar

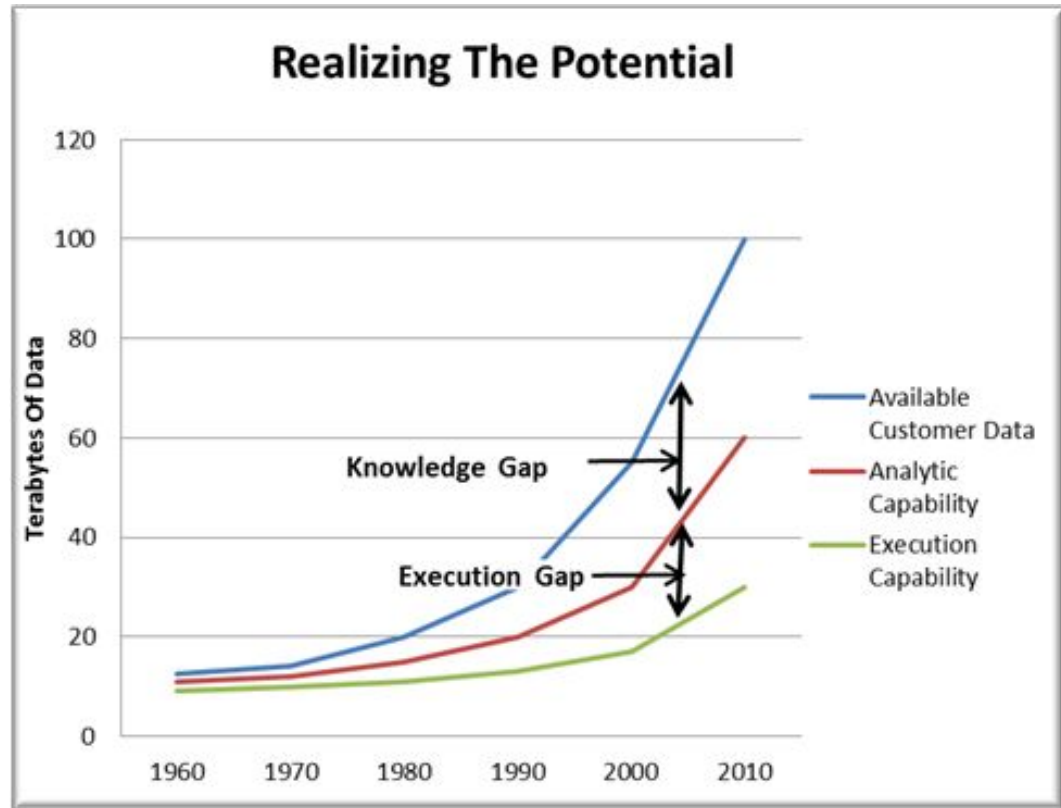


Parkinson's Law:

Data expands to fill the space available for storage

Moore's Law:

The information density on silicon integrated circuits doubles every 18 to 24 months.



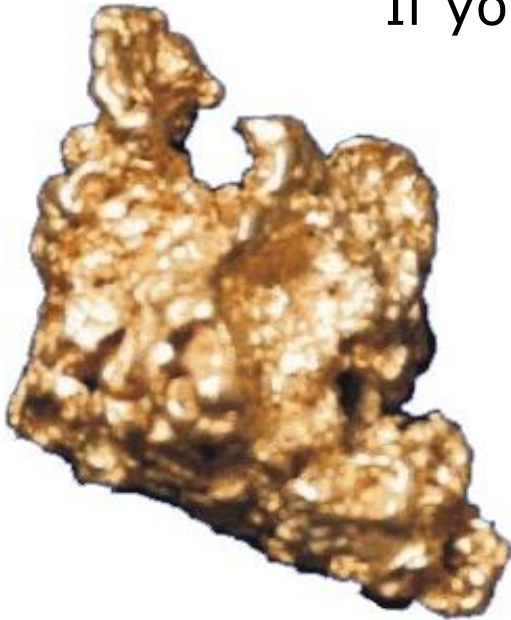
Analitik Çalışma için İhtiyaçlar



Analitik Metodlar sayesinde gördüklerimiz...

Analitik modelleme yöntemlerinin bize gösterdikleri





"If you've got terabytes of data,
and your relying on
data mining to find
interesting things
in there for you,
you've lost
before you've even begun."

— Herb Edelstein

Magic?

No, more like gardening

- **Seeds** = Algorithms
- **Nutrients** = Data
- **Gardener** = You
- **Plants** = Programs



Sample Applications

- Web search
- Computational biology
- Finance
- E-commerce
- Space exploration
- Robotics
- Information extraction
- Social networks
- Debugging
- [Your favorite area]

ML in a Nutshell

- Tens of thousands of machine learning algorithms
- Hundreds new every year
- Every machine learning algorithm has three components:
 - **Representation**
 - **Evaluation**
 - **Optimization**

Representation

- Decision trees
- Sets of rules / Logic programs
- Instances
- Graphical models (Bayes/Markov nets)
- Neural networks
- Support vector machines
- Model ensembles
- Etc.

Evaluation

- Accuracy
- Precision and recall
- Squared error
- Likelihood
- Posterior probability
- Cost / Utility
- Margin
- Entropy
- K-L divergence
- Etc.

ML in Practice

- Understanding domain, prior knowledge, and goals
- Data integration, selection, cleaning, pre-processing, etc.
- Learning models
- Interpreting results
- Consolidating and deploying discovered knowledge
- Loop

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