




Machine Learning Process

CSCI 447/547 MACHINE LEARNING




Outline

- What is Learning?
 - How do we Learn?
 - Key Components in Learning
 - Key Processes in Learning
- 



What is Learning?

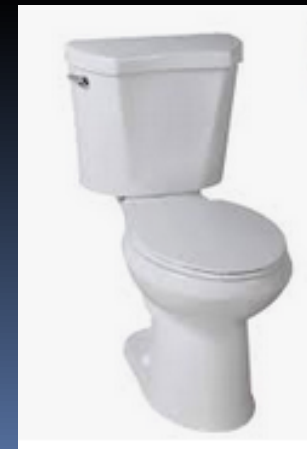
- The acquisition of knowledge or skills through experience, study or by being taught
 - A process that results in a change in knowledge or behavior as a result of experience
 - The process of acquiring new, or modifying existing, knowledge, behaviors, skills, values or preferences
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How do we Learn?


- Existing model of the world
- Gather new evidence
 - Experience
 - Data
 - Incident
 - Demonstration
- Modify our model (or some piece of it)
- Evaluate our new model

Learning from Examples: A Chair






Key Components in Machine Learning

- Input
 - Model
 - Response
- 




Key Processes in Machine Learning

- Ability to:
 - Gather evidence
 - Modify the model
 - Which in turn modifies the response
 - Evaluate the effectiveness of the new response
- 



Gathering Evidence

- Datasets
 - Data Sources
 - Unstructured Input Data
 - Guided Experience / Exploration
 - Random Experience
- 


Modifying Model / Response

- Adding, modifying, refining “knowledge”
 - Different levels:
 - Facts
 - Concepts
 - Procedures
 - Meta-Knowledge
- Creating or modifying a mathematical representation
- Assessing importance/relevance of input




Evaluation

- External
 - Performance on unseen situations
 - Numeric difference between actual and expected
- Internal
 - Efficiency
 - Consistency
- None
 - Unsupervised learning
 - Delayed feedback



But What Happens After Learning?

- Key distinction between data mining and machine learning
 - Not just looking for patterns
 - Want to operationalize what we've learned
 - Use our new knowledge to do something differently
 - Do we continue learning? Or use the model as-is?
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Summary

- What is Learning?
- How do we Learn?
- Key Components in Learning
- Key Processes in Learning

