# Broader and Earlier Access to Machine Learning

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## Goal

Create educator modules for teachers in any discipline to include relevant Machine Learning concepts.

- Identify Relevant Topics
- Produce Ready Modules
- Disseminate Online

## Module Example

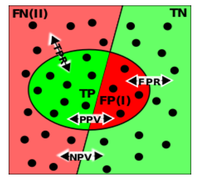
Complete material to teach machine learning in context, understandable by non-computer scientists. Typical module contains:

- **Instructor Overview** - background, concepts
- **Handouts** - Activities
- **Data** - general and discipline specific
- **Evaluation** - pre/post tests, quizzes

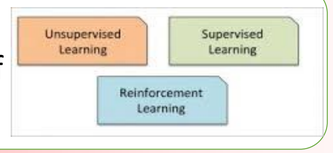
## Modules

***Intro***
Fundamentals, background, Animal Game


***Evaluating Classifiers***
How to compare results



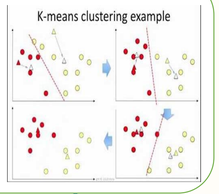

***Kinds of ML***
Overview of ML areas



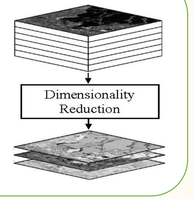

***Decision Trees***
Uses WEKA and data sets

***Text Classification***
introduces WEKA, classify tweets, authors WEKA


***K - Means***
Uses WEKA, advanced topic



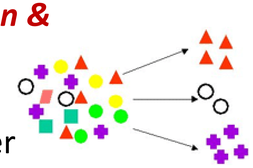

***Dimensionality Reduction***
Uses WEKA, advanced topic



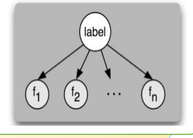

***Choosing Inputs***
Approaches to data sets

***Neural Networks***
Uses SimBrain software

***Classification & Clustering***
Hands-on, no computer needed

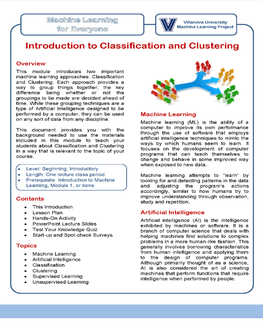


***Naive Bayes***
Uses Python or WEKA

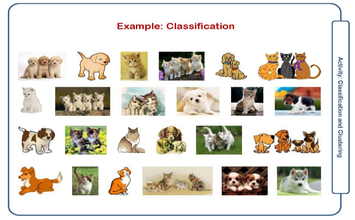



## Module Example: Classification & Clustering

Instructor Overview

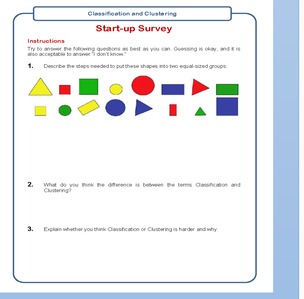


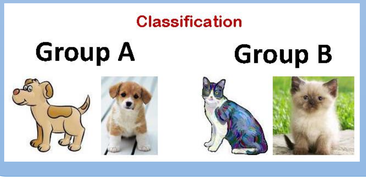

Hands-on Activity




Create groups using example groups or by finding similarities

Pre & Post Test





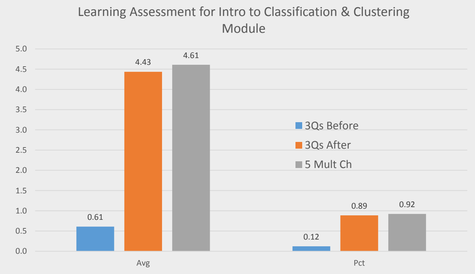

## Machine Learning

Computer programs that find patterns in data, enabling them to "learn" and make decisions based on that learning.

## Results

Results of pre/post tests for Classification & Clustering module show strong learning and good retention.

Pre test given **before** any material. Post test given **2 days later**.




41 students pre/post test scores went from low (12%) to solid (89%) understanding on identical questions, with strong ability to apply knowledge (92%) to similar problems.

## Future Plans

- Complete model design
- Gather more domain-specific data sets
- Disseminate via: **ComputingPortal.org/MachineLearning**

## Acknowledgements

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