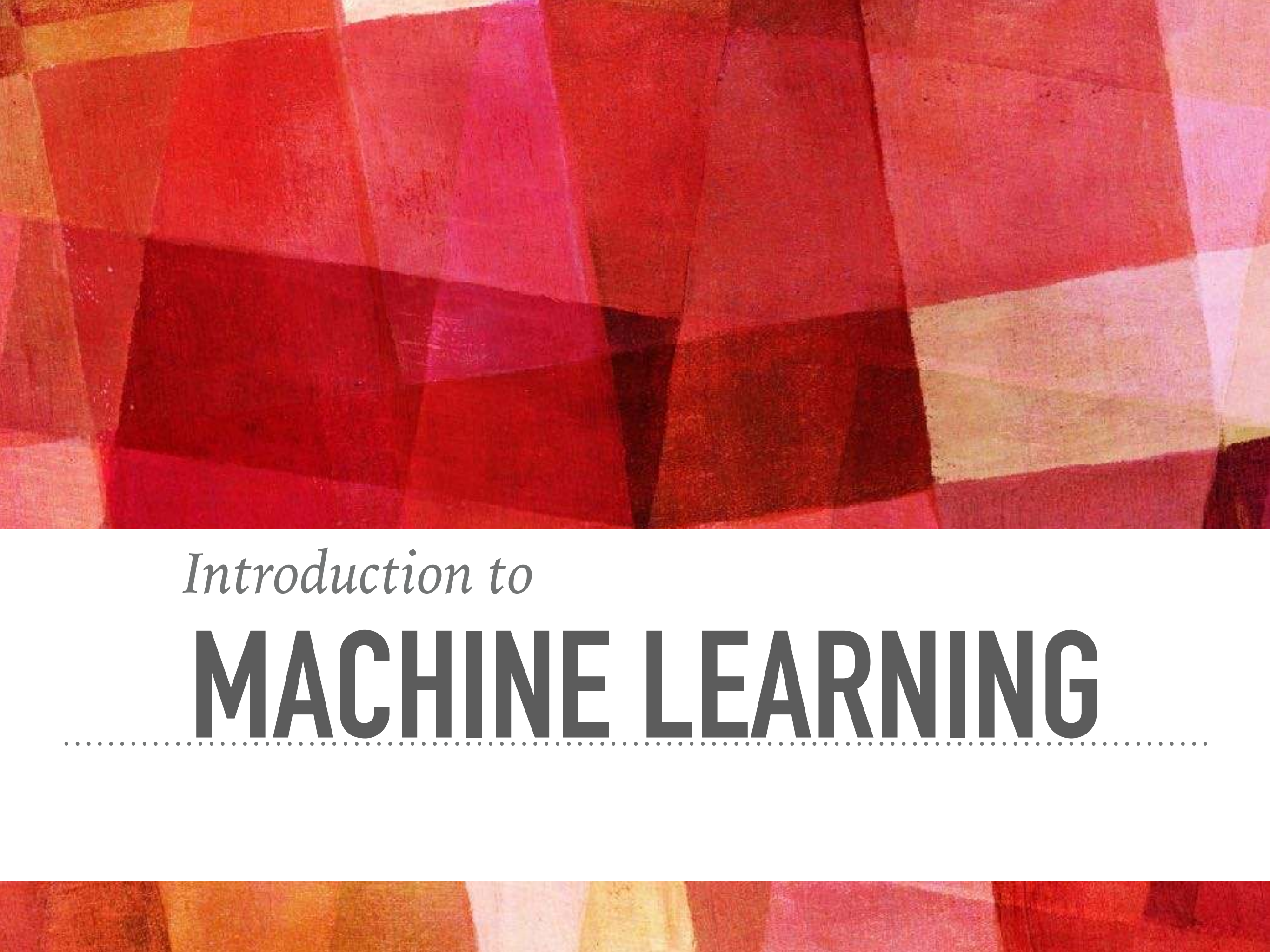
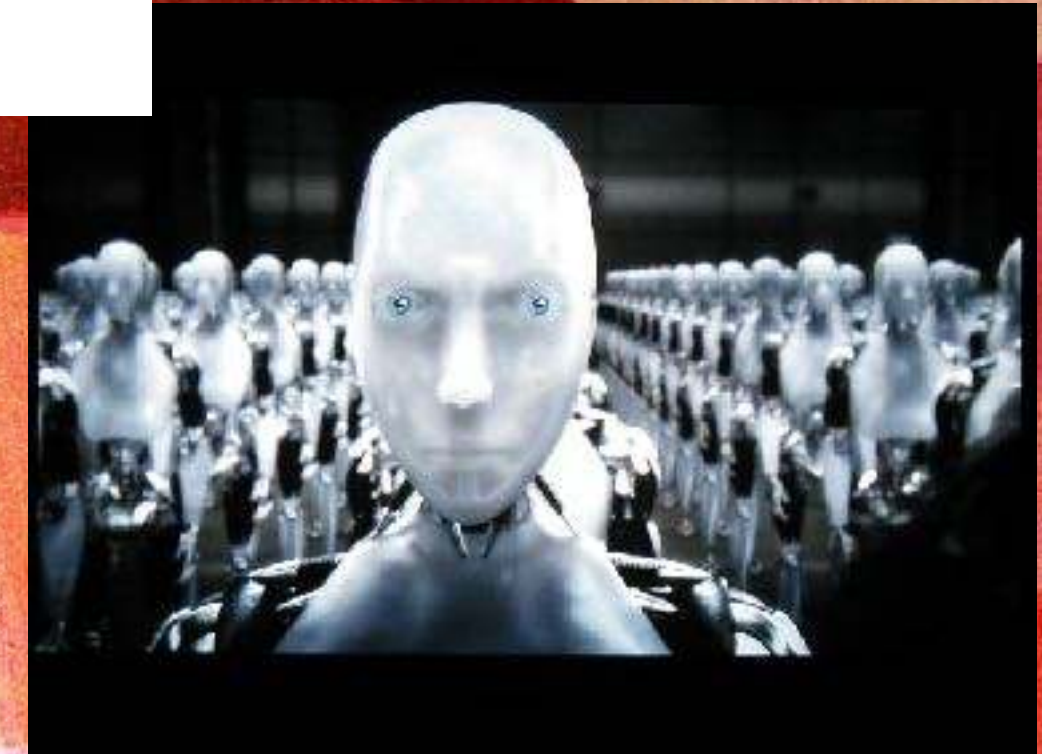




Introduction to

MACHINE LEARNING

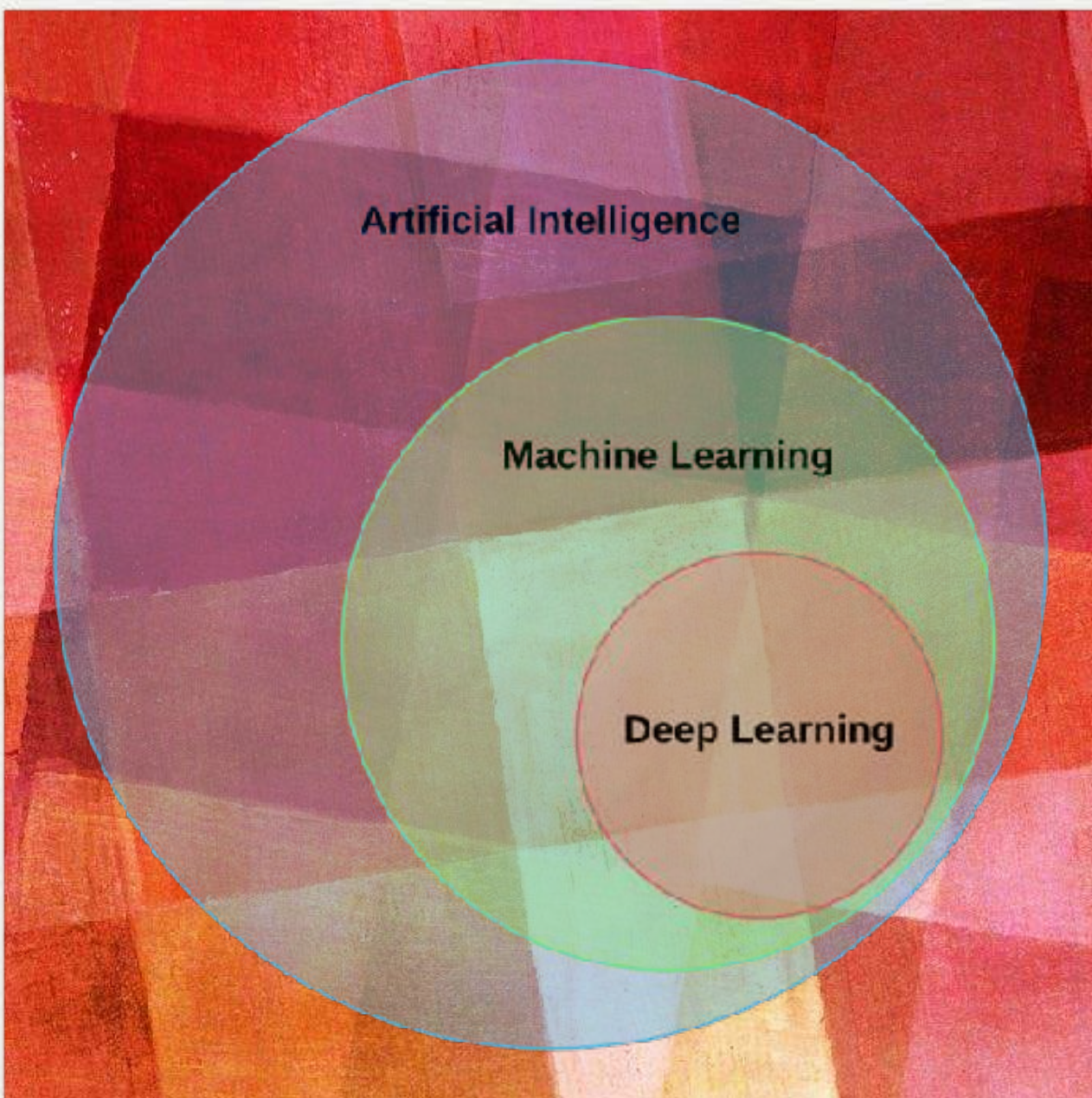


WHAT IS MACHINE LEARNING?

.....

- The capability of a computer to learn from data and experience.
- A computer program is said to learn from experience E with respect to some task T and some performance measure P , if its performance on T , as measured by P , improves with experience E .

-Tom Mitchell, 1997

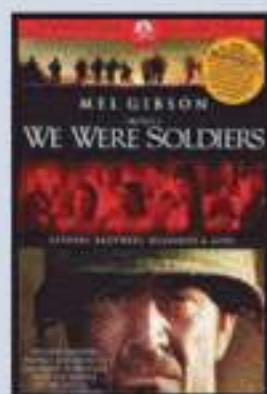


Where is ML Used Today

- Internet search clustering
- Knowledge management systems
- Social network mapping
- Taxonomy transformations
- Marketing analytics
- Recommendation systems
- Log analysis & event filtering
- SPAM filtering, fraud detection



Joe



#3



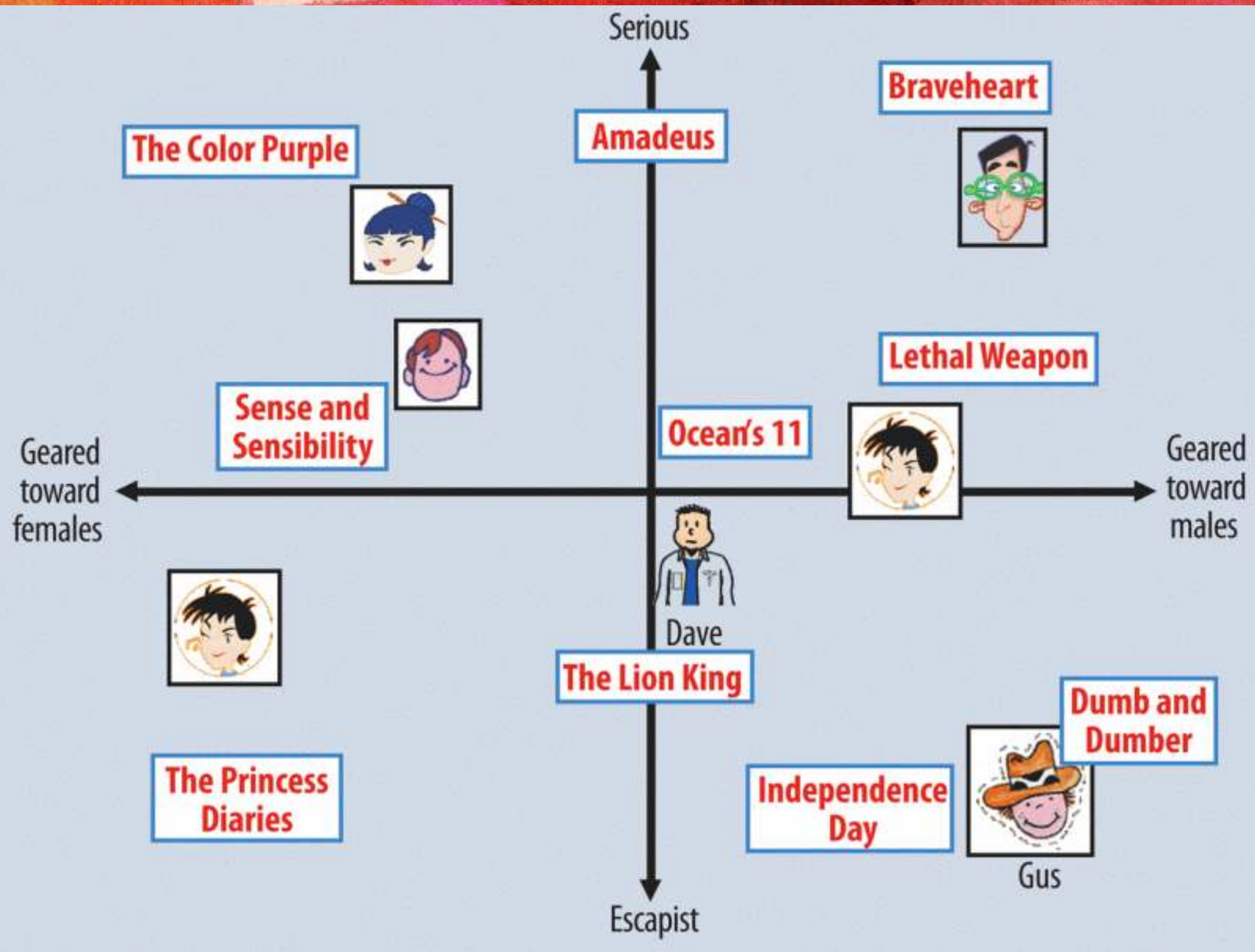
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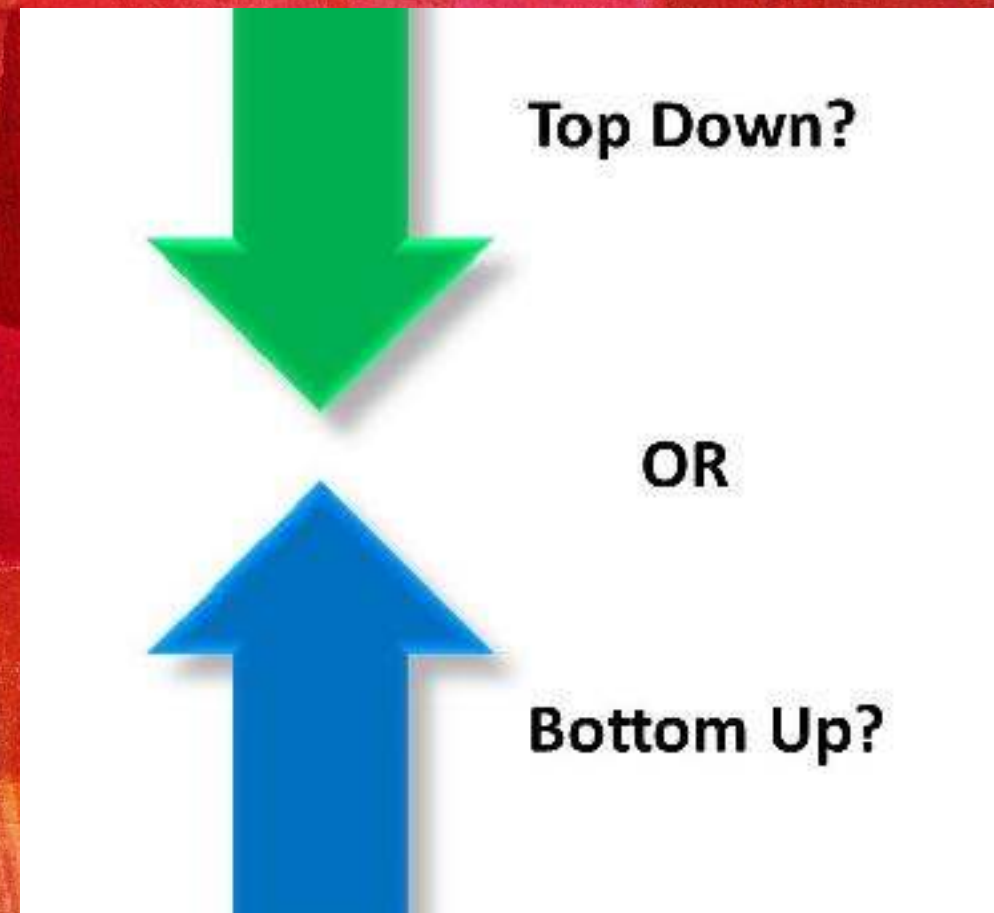


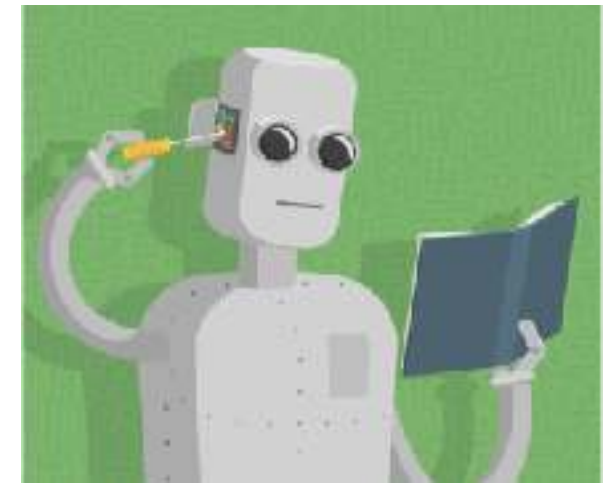
#4



DEDUCTION VS INDUCTION

- Deductive reasoning works from general to specific. (Top-down approach) We go into hypothesis we can test, then we test these hypothesis with data to confirm theories.
- Inductive reasoning works from specific observations to broader generalizations. (Bottom up approach) We make observations and detect patterns, formulate hypotheses, and creating a model in the end.



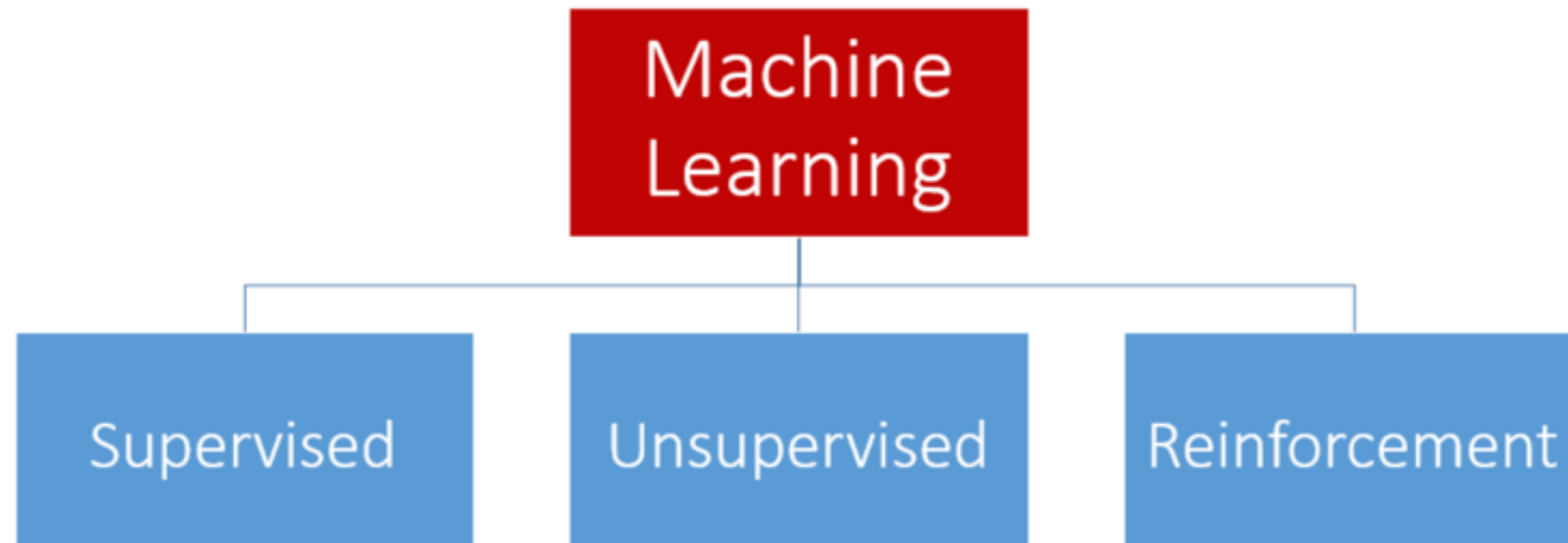


Elements of Machine Learning

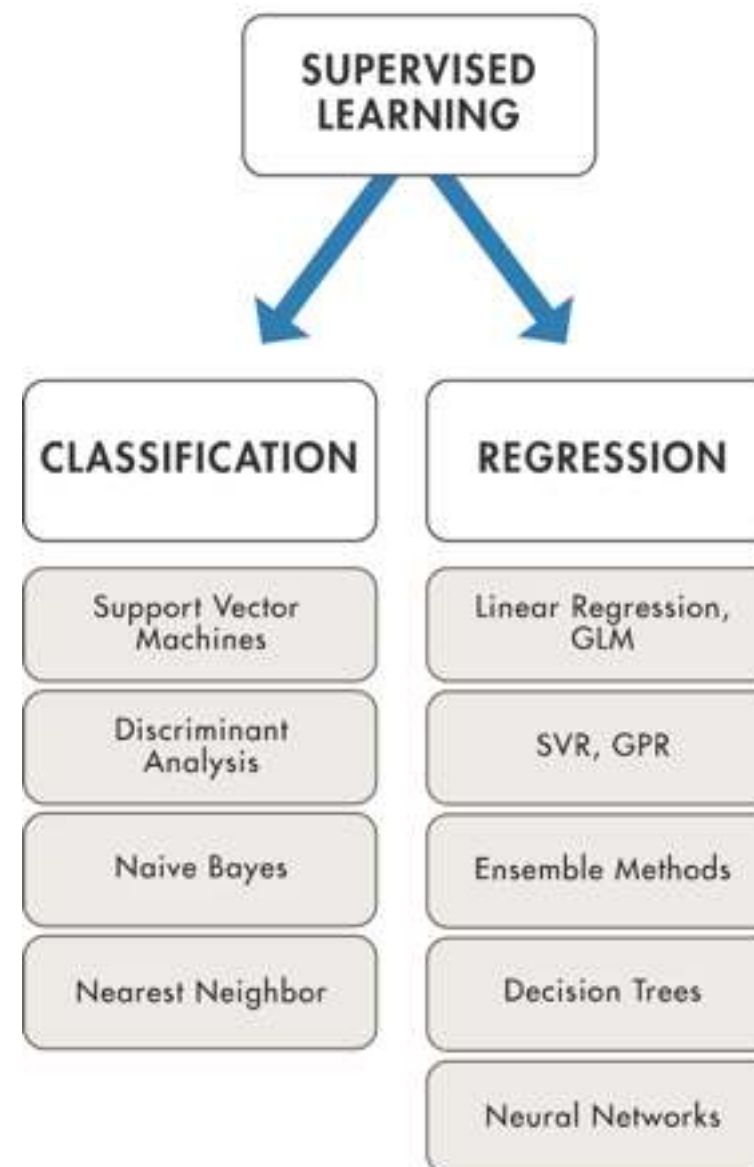
- Generalization - how well a model performs on new data
- Data - Training Data - examples to learn from
Test Data- examples used to test performance
- Models - Theoretical assumptions
Knn, decision trees, naive bayes
- Algorithms - Learning algorithms that infer the model parameters from the data
-Inference algorithms that infer prediction from a model



TYPES OF MACHINE LEARNING



TYPES OF MACHINE LEARNING



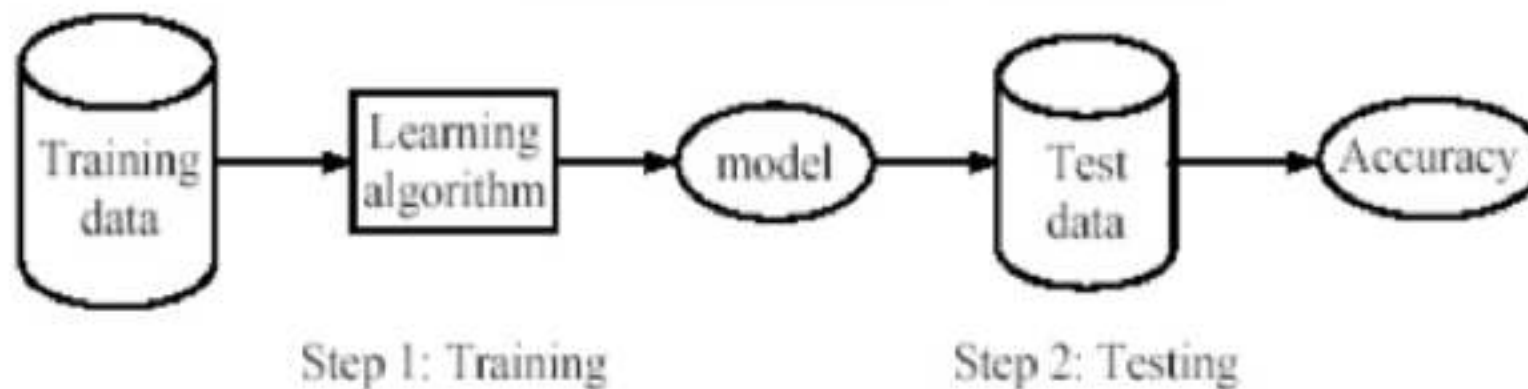
Develop predictive model based on both input and output data

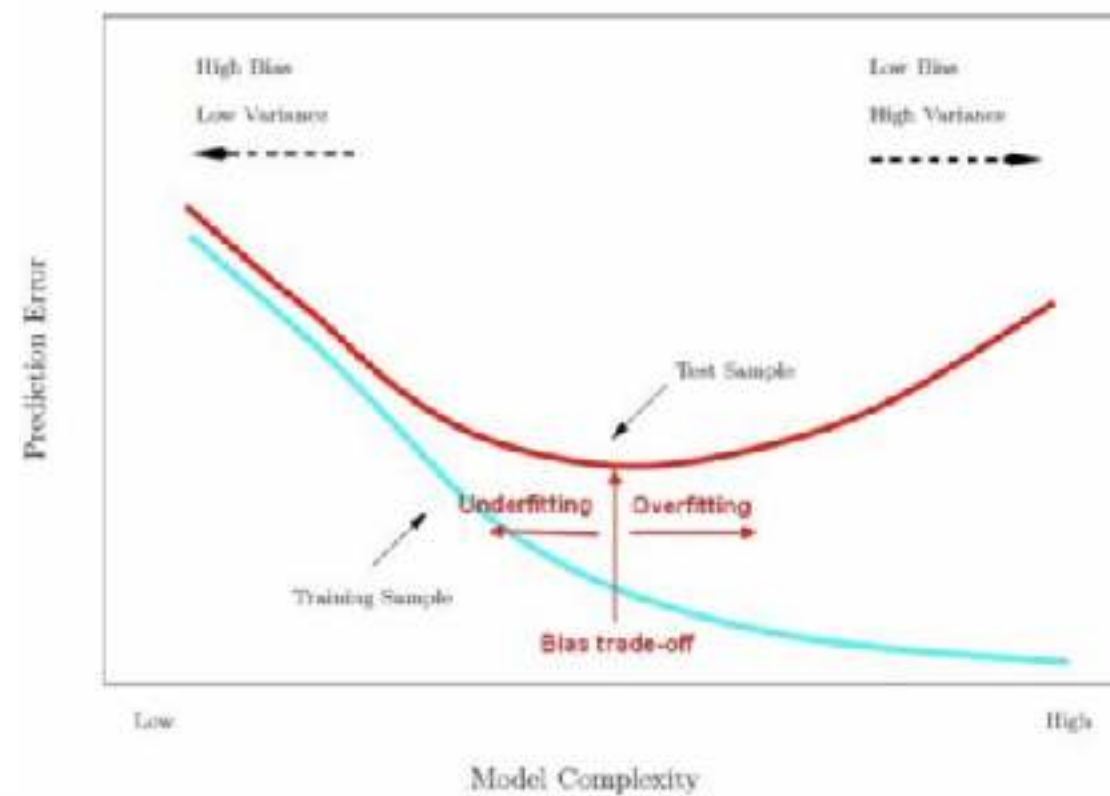
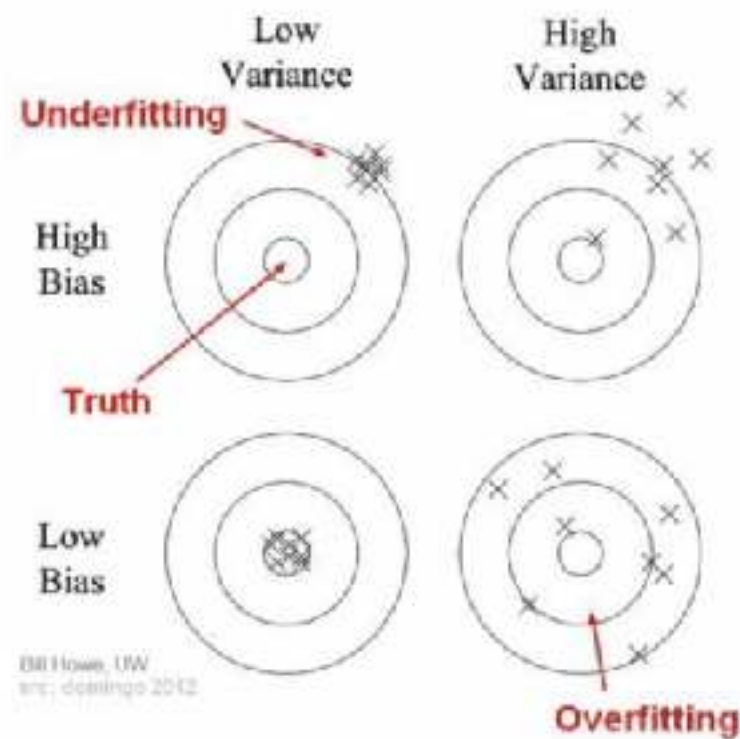
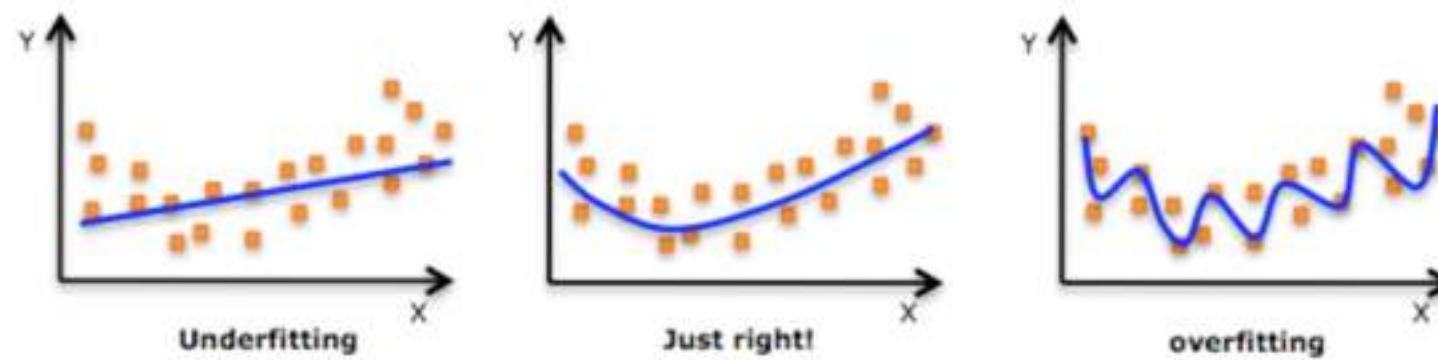
Supervised learning process: two steps

Learning (training): Learn a model using the **training data**

Testing: Test the model using **unseen test data** to assess the model accuracy

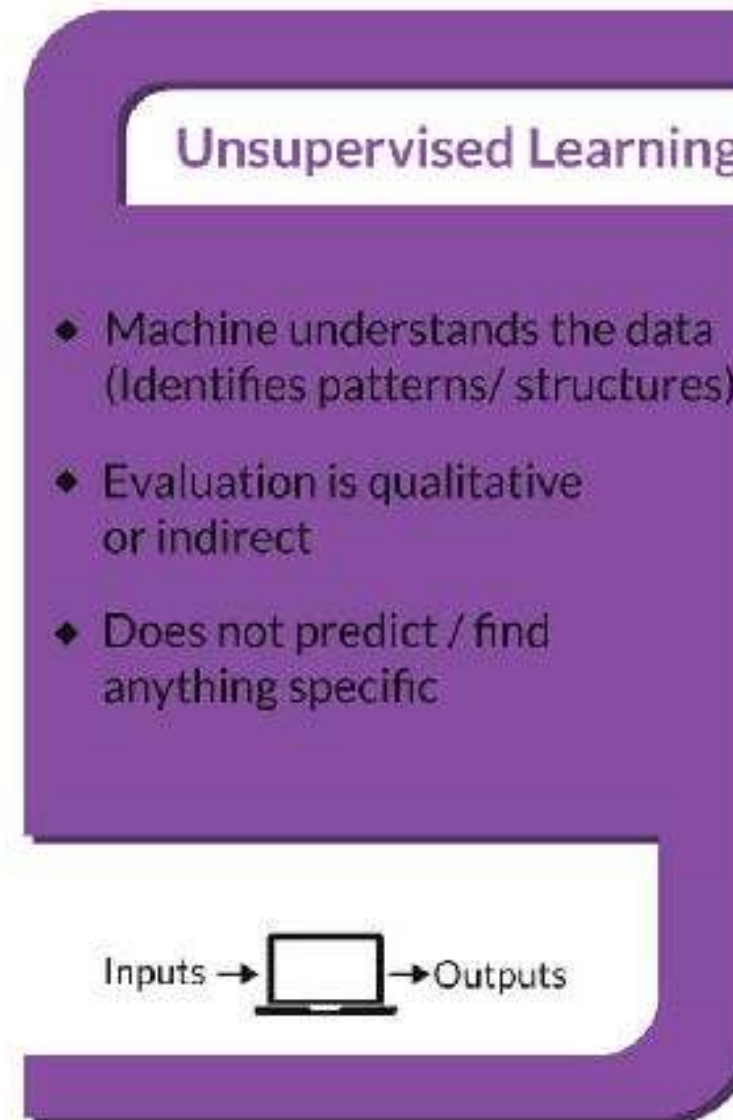
$$Accuracy = \frac{\text{Number of correct classifications}}{\text{Total number of test cases}},$$





HOW GOOD IS OUR PREDICTION?

TYPES OF MACHINE LEARNING



Group and interpret data based only on input data

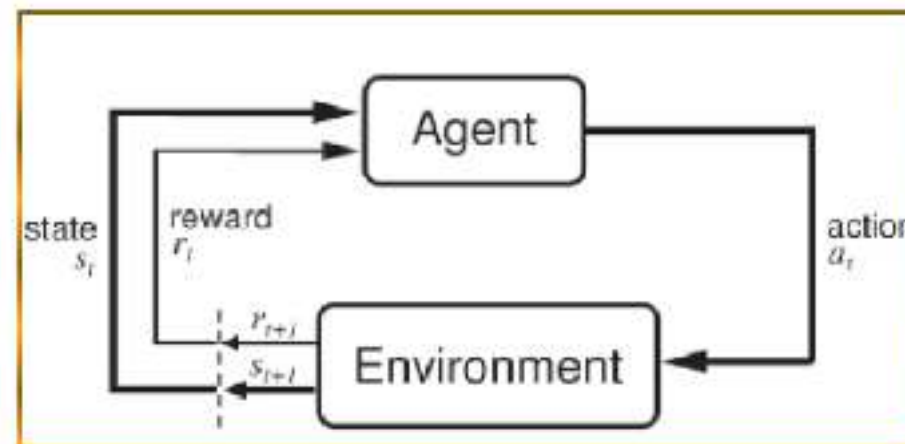
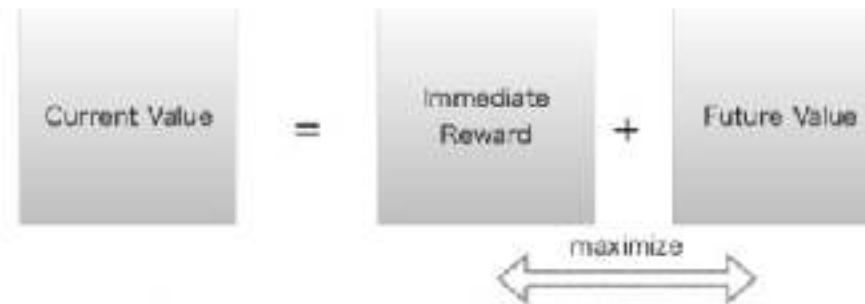
TYPES OF MACHINE LEARNING

Reinforcement Learning

- ◆ An approach to AI
- ◆ Reward based learning
- ◆ Learning from +ve & -ve reinforcement
- ◆ Machine learns how to act in a certain environment
- ◆ To maximize rewards



Structure of Bellman equation

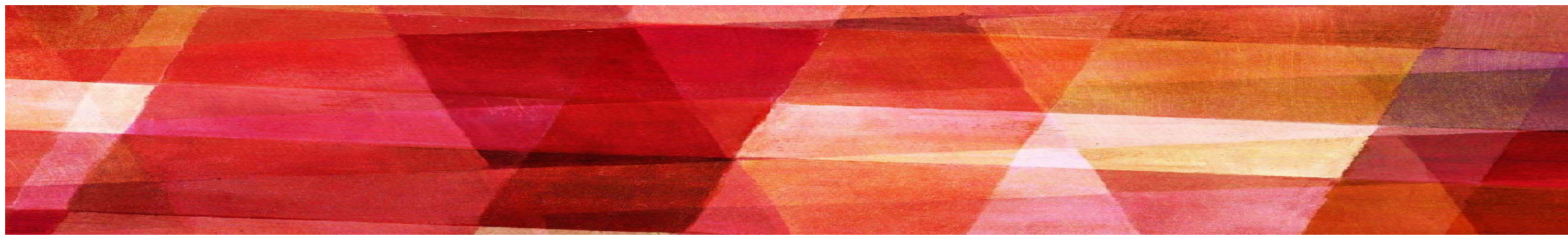


Q learning

- Initiate Q table
- Observes
- Execute a, observe s', r
- Update Q with $\langle s, a, s', r \rangle$

Dyna Q

- Learn Model
- Hallucinate Experience
- Update Q



Is this Machine Learning?

