INTRO TO DATA SCIENCE
LESSON 2: MACHINE LEARNING

I. BASICS OF LINEAR ALGEBRA

II. THE PYTHON CONTROL FLOW

III. MATRIX OPERATIONS IN PYTHON

QUESTIONS?

I. WHAT IS MACHINE LEARNING
II. TYPES OF MACHINE LEARNING PROBLEMS
III. MATRICES CONT.

LAB:
IV. DESIGNING A REGRESSION USING MATRICES
V. USING NUMPY, SCIPY, AND PANDAS

QUESTIONS?

I. WHAT IS MACHINE LEARNING

From Wiki:

"Machine learning, a branch of artificial intelligence, is about the construction and study of systems that can learn from data."

Who does the teaching?

From Wiki:

"Machine learning, a branch of artificial intelligence, is about the construction and study of systems that can learn from data."

"In Knowledge Discovery, machine learning is most commonly used to mean the application of induction algorithms, which is one step in the knowledge discovery process."

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"The core of machine learning deals with representation and generalization..."

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▸ representation – extracting structure from data
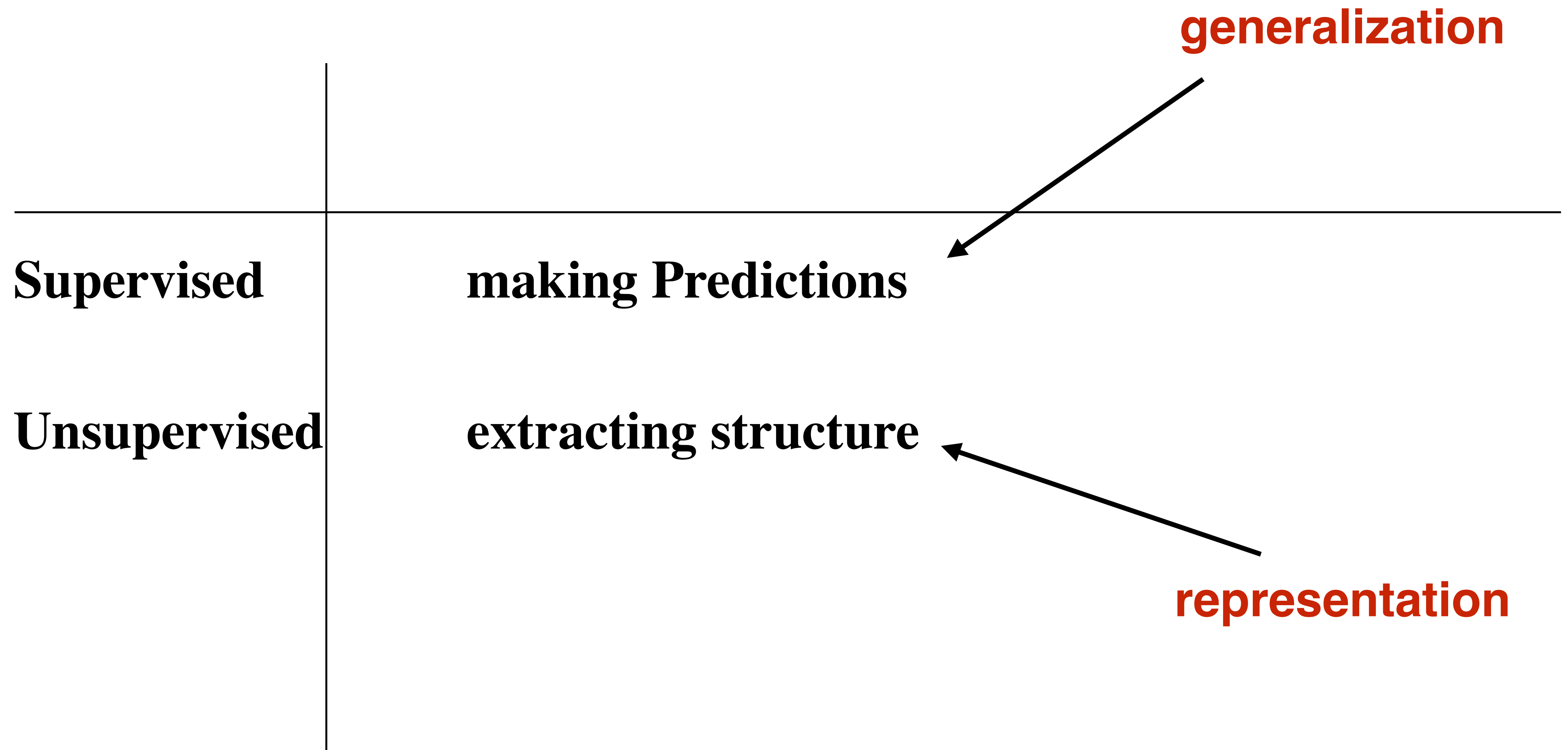
▸ generalization – making predictions from data

REVIEW

Give your definition of Machine Learning

II. TYPES OF MACHINE LEARNING PROBLEMS

Supervised	**making Predictions**
Unsupervised	**extracting structure**

generalization

Supervised	**making Predictions**
Unsupervised	**extracting structure**

representation

	Continuous	Categorical
	quantitative	qualitative

	Continuous	**Categorical**
Supervised	**making quantitative predictions**	**making qualitative predictions**
Unsupervised	**extract quantitative structure**	**extract qualitative structure**

	Continuous	Categorical
Supervised	regression	classification
Unsupervised	dimension reduction	clustering

REVIEW

I. What is the difference between classification and clustering models?

REVIEW

I. What is the difference between classification and clustering models?
   - **Supervised vs Unsupervised Learning**

II. Where does ML fit into the Data Science Workflow?

Ask a Question

Acquire Data

Clean Data

Interact with Data

Analyze your Data

Represent the Results

Iterate and Refine you Results

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Almost Everywhere!!

III. MATRICES CONT.

Identity Matrices

$$I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

A 3x3 Identity Matrix

Inverse Matrix

The Inverse of A is A^{-1} only when:

$$A \times A^{-1} = A^{-1} \times A = I$$

Sometimes there is no Inverse at all.

IV. LAB: USING NUMPY, SCIPY, AND PANDAS