Machines that learn
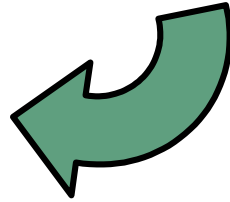
How?

What?

Scenario

Machines that learn

How? — Data

What?
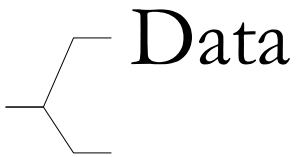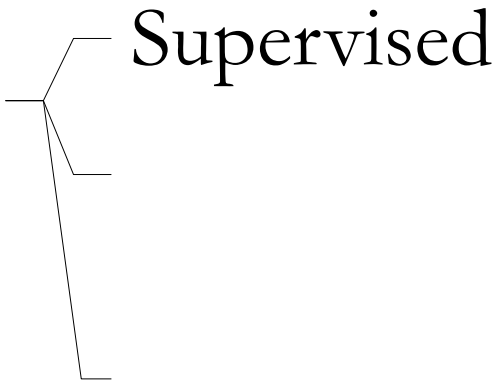
Data

	features				label
Sepal length	**Sepal width**	**Petal length**	**Petal width**		**Species**
5.1	3.5	1.4	0.2	Iris-setosa
5.7	2.8	4.5	1.3	Iris-versicolor
4.4	2.9	1.4	0.2	Iris-setosa
4.9	2.5	4.5	1.7	Iris-virginica
6.0	2.9	4.5	1.5	Iris-versicolor
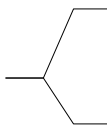
examples
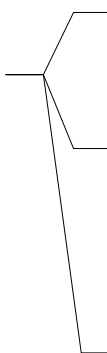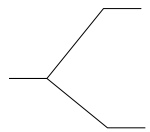
Machines that learn

How? ⎯ Data

What? ⎯ Supervised

Machines that learn

How? ─⟨ Data

What? ─⟨ Supervised ─⟨ Classification
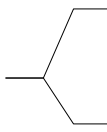
Picking a new Flower
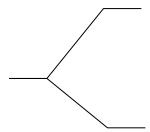
Sepal length	Sepal width	Petal length	Petal width
6.9	3.1	4.9	1.5

Picking a new Flower

Sepal length	Sepal width	Petal length	Petal width	Species
6.9	3.1	4.9	1.5	Iris-versicolor

Machines that learn

How?
— Data
— Algorithm

What?
— Supervised — Classification

Algorithm

| Input	Ingredients	Data
⇩	⇩	⇩
Number of predefined Steps	Cooking Recipe	Machine Learning Algorithm
⇩	⇩	⇩
Output	Dish	Decision
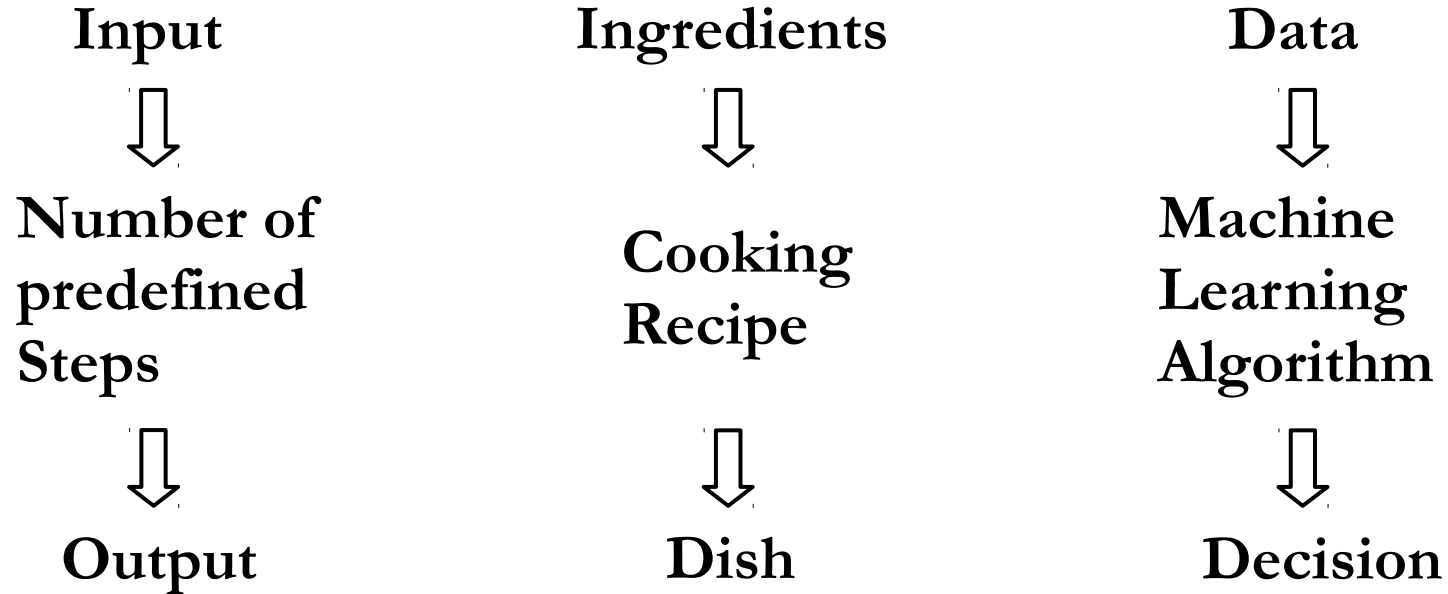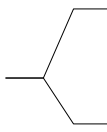
How Machine Learning works
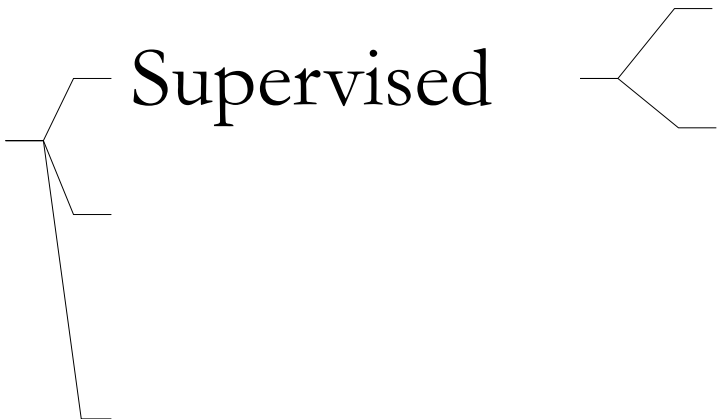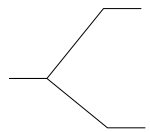
Sepal length	Sepal width	Petal length	Petal width	Species
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6.0	2.9	4.5	1.5	Iris-versicolor

Scenario

Machines that learn

How?
- Data
- Algorithm
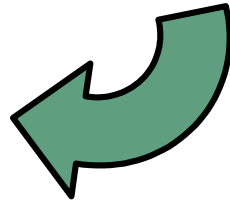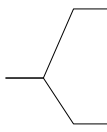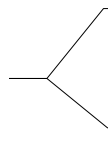
What?
- Supervised
  - Classification

Machines that learn

How?
— Data
— Algorithm
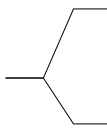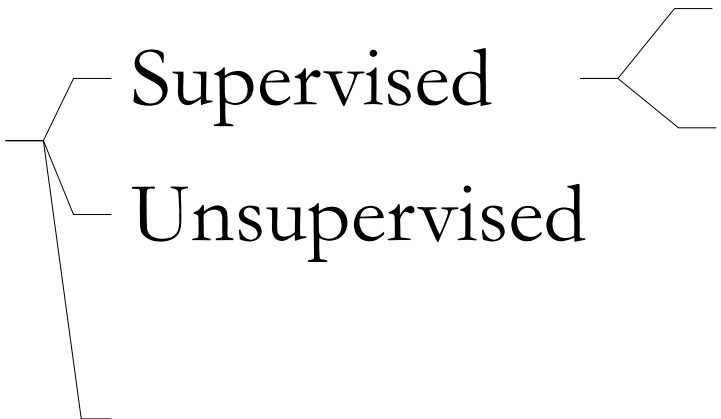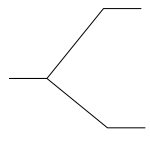
What?
— Supervised
—— Classification
—— Regression

Regression

sqft_living	sqft_lot	bedrooms	floors	waterfront	yr_built	price
1180	5650	3	1.0	0	1955	221900.0
2570	7242	3	2.0	0	1951	538000.0
770	10000	2	1.0	0	1933	180000.0
1960	5000	4	1.0	0	1965	604000.0
1680	8080	3	1.0	0	1987	510000.0

Machines that learn

How? — Data
       — Algorithm

What? — Supervised — Classification
        — Regression
        — Unsupervised

Unsupervised Learning

Supervised Learning:

Sepal length	Sepal width	Petal length	Petal width	Species
5.1	3.5	1.4	0.2	Iris-setosa
5.7	2.8	4.5	1.3	Iris-versicolor
4.4	2.9	1.4	0.2	Iris-setosa
4.9	2.5	4.5	1.7	Iris-virginica
6.0	2.9	4.5	1.5	Iris-versicolor

⬇

Unsupervised Learning:

Sepal length	Sepal width	Petal length	Petal width
5.1	3.5	1.4	0.2
5.7	2.8	4.5	1.3
4.4	2.9	1.4	0.2
4.9	2.5	4.5	1.7
6.0	2.9	4.5	1.5

Unsupervised Learning

Machines that learn

How?
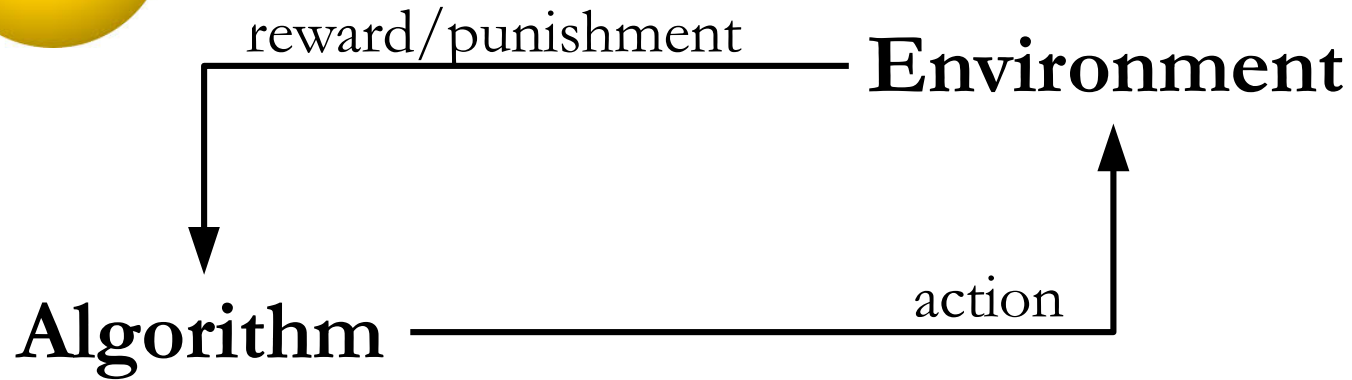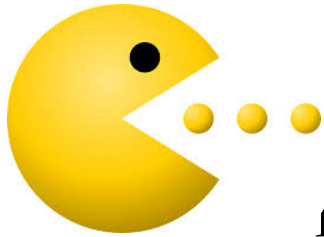- Data
- Algorithm
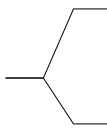
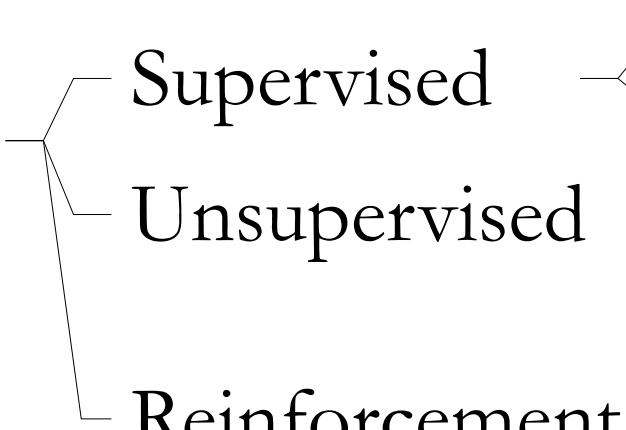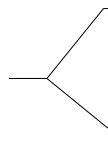**What?**
- Supervised
  - Classification
  - Regression
- Unsupervised
- Reinforcement

Reinforcement Learning

reward/punishment

Environment

Algorithm

action

Machines that learn

How?
- Data
- Algorithm

What?
- Supervised
  - Classification
  - Regression
- Unsupervised
- Reinforcement