

Machine Learning

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"Field of study that gives computers the ability to learn without being explicitly programmed" -- Arthur Samuel (1959)

1950 checkers game

Q: If the checkers program had been allowed to play only ten games (instead of tens of thousands) against itself, a much smaller number of games, how would this have affected its performance?

-> Would have made it worse.

Application of Machine learning

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Sub field of AI

Artificial General Intelligence AGI

Supervised vs Unsupervised Machine Learning

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- Supervised machine learning
 - Used in most real world applications
- Unsupervised machine learning
- Recommender system
- Reinforcement learning

Practical advice for applying learning algorithms.
Which tools to use for what problems.

Supervised Machine Learning

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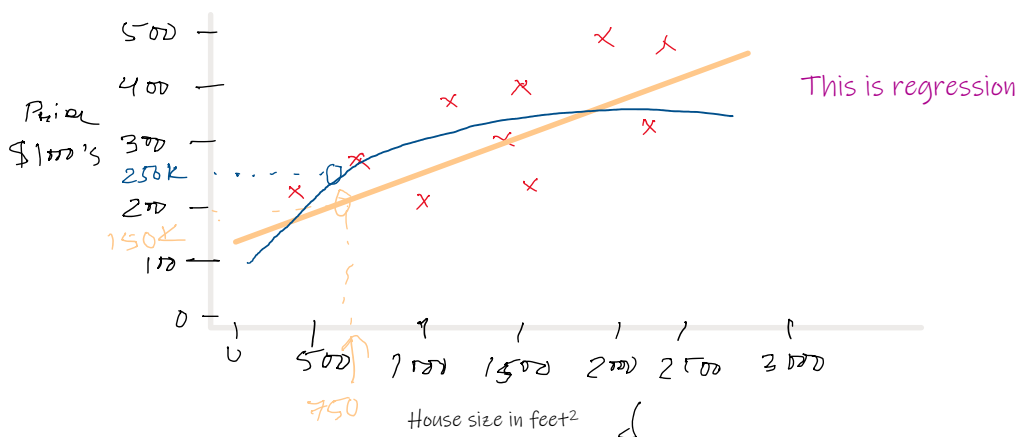


Learns from X to Y mapping

Learns from being given "right answers"/ output labels

Input(x)	Output(y)	Applications
email	Spam?(0/1)	Spam filter
Audio	Text transcript	Speech recognition
English	Spanish	Machine translation
Ad, user info	Click?(0/1)	Online advertising
Image, radar info	Position of other cars	Self-driving car
Image of phone	Defect?(0/1)	Visual inspection

Regression : housing price prediction



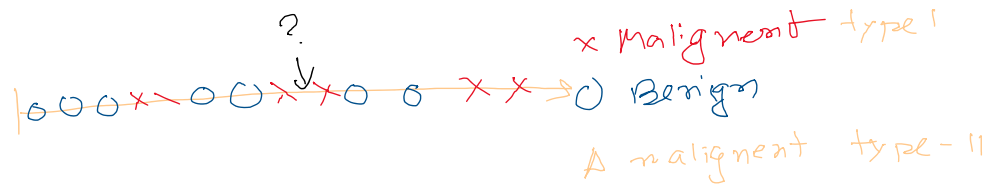
Predict a number from infinitely many possible outputs.

Classification:
Breast Cancer Detection
Malignant benign



Size	diagnosed
2	0
5	0
7	0
7	1
...	...

In classification problem can be more than two possible output categories

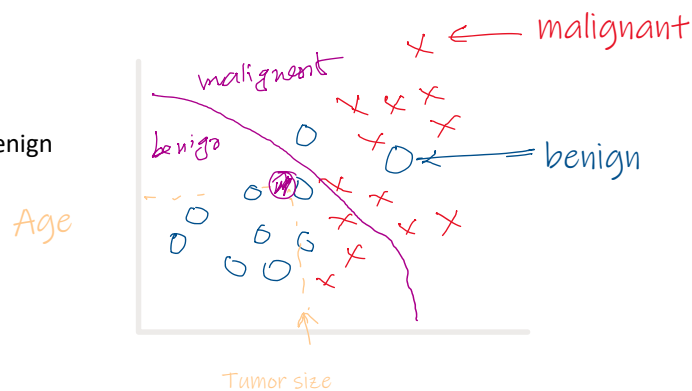


output categories/ class

class can also be numbers 0,1,2 cat, dogs

Two or more outputs

more likely to be benign



Here any two inputs

age, tumor size

Can have

many more input values

- thickness tremor clump
- uniformity of cell size
- uniformity of cell shape

In summary:

Supervised Learning

Learns from being given "right answer"

Regression

Predicts a number

Infinitely many possible outputs

Classification

Predicts categories

small number of possible outcome

Practice Quiz

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1. Which are the two common type of supervised learning?

- ☒ Classification
- ☐ Clustering
- ☒ Regression

2. Which of these is a type of unsupervised learning?

- ☐ Regression
- ☐ Classification
- ☒ Clustering