

Machine Learning

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Useful References

- Machine learning is a **HUGE** field!
- Lots of materials online in Youtube / Coursera / ...

[Christopher Bishop's book on the topic](#)

[Andrew Ng's Coursera classes](#)

[Google AI classes/courses](#)

Useful References

- Currently, a lot of focus on Neural Networks

[Hugo Larochelle's classes on Neural Networks](#)

[Andrej Karpathy's Classes on Neural Networks for Visual Recognition](#)

[Natural Language Processing with Deep Learning classes by Christopher Manning and Richard Socher](#)

What is Machine Learning?

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Wikipedia is not helpful

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Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead.

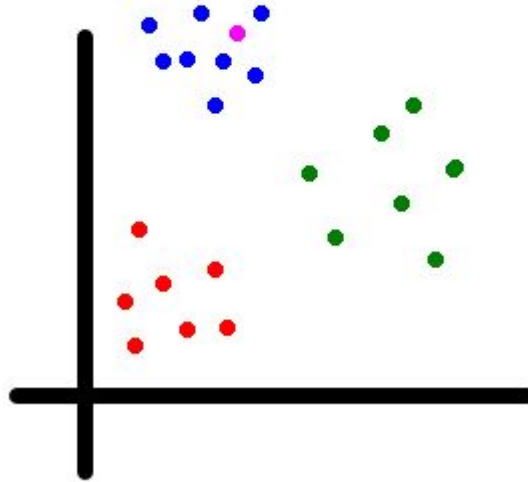
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Machine learning (ML) is a subset of artificial intelligence (AI) in which computer systems use explicit instructions, r

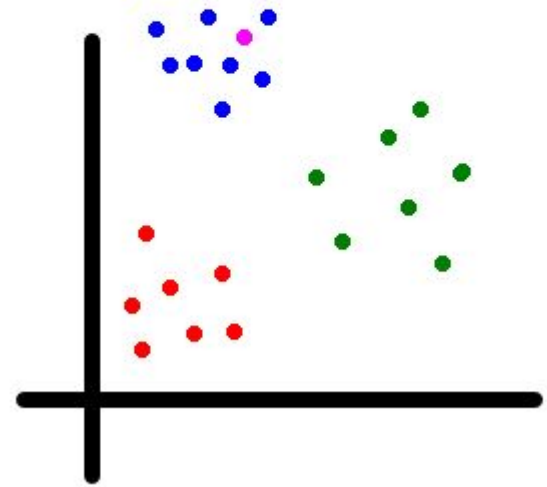
WHAT IS THE CLASS
OF THE PINK DOT?

*l statistical models that
actively without using*



What is Machine Learning?

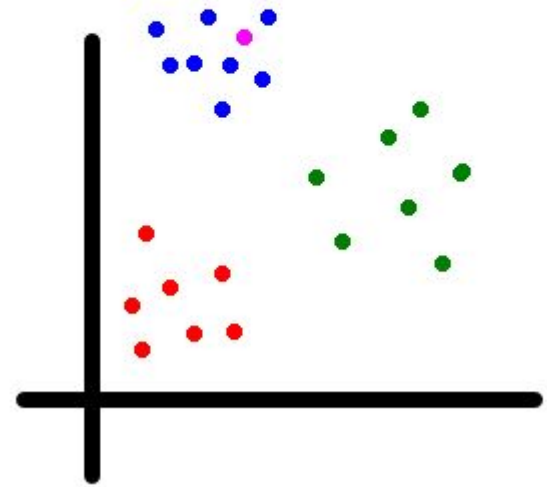
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What is Machine Learning?

The colorful dots are the “training set”

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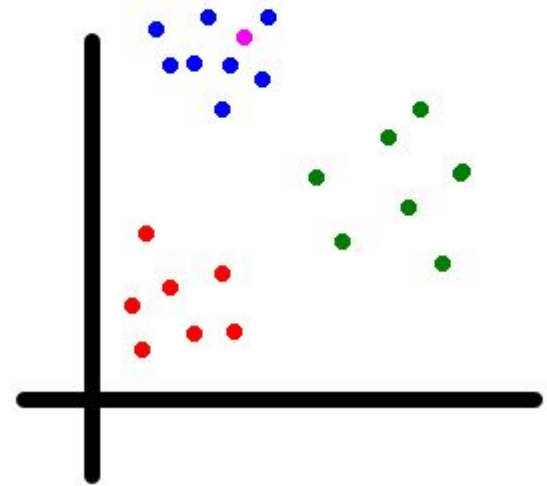


What is Machine Learning?

The colorful dots are the “training set”

The pink dot is part of the “test set”

WHAT IS THE CLASS
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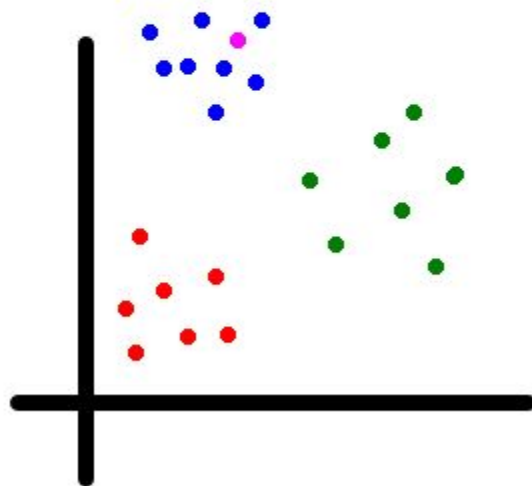
Classification

Given

- *Domain* or *input space* I
- Set of *classes* or *output space* $C = \{c_1, \dots, c_m\}$
- *Data*: pairs (d_i, l_i) , where
 - $d_i \in I$ is a sample item
 - $l_i \in C$ is a class label

Task: Find a function $f : I \rightarrow C$ such that $f(d) = l$ for any (new, unseen) sample d whose true class label is l .

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Terminology

- Elements of I are the *input*
- The predicted class is the *output*
- The function f describes how the model converts *input* to *output*
- The model itself is called a *classifier*