Google

#GeoForGood19

EE Classifiers and Regression

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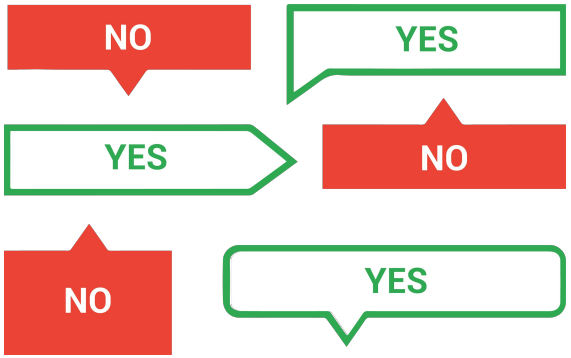
Agenda

- What is Classification, Regression and Machine Learning?
- Supervised Classification example in EarthEngine
- Regression example in EarthEngine
- Unsupervised classification example in EarthEngine

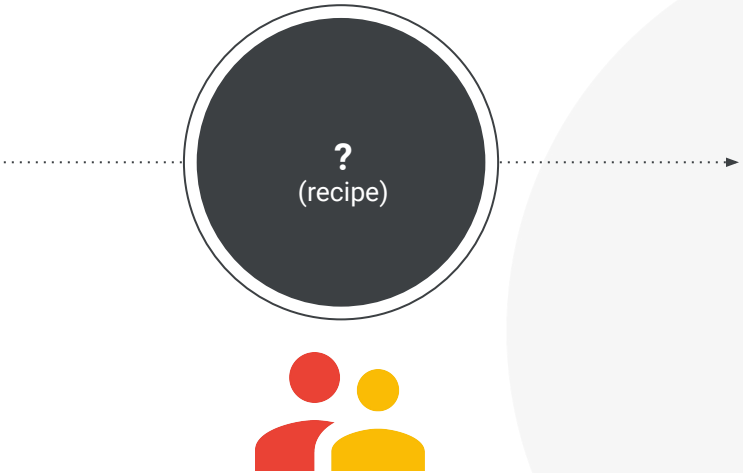
Input
BLACK BOX
Output

Machine learning is an approach to making lots of small decisions



Machine learning vs traditional programming

Traditional programming: Handcrafted recipe



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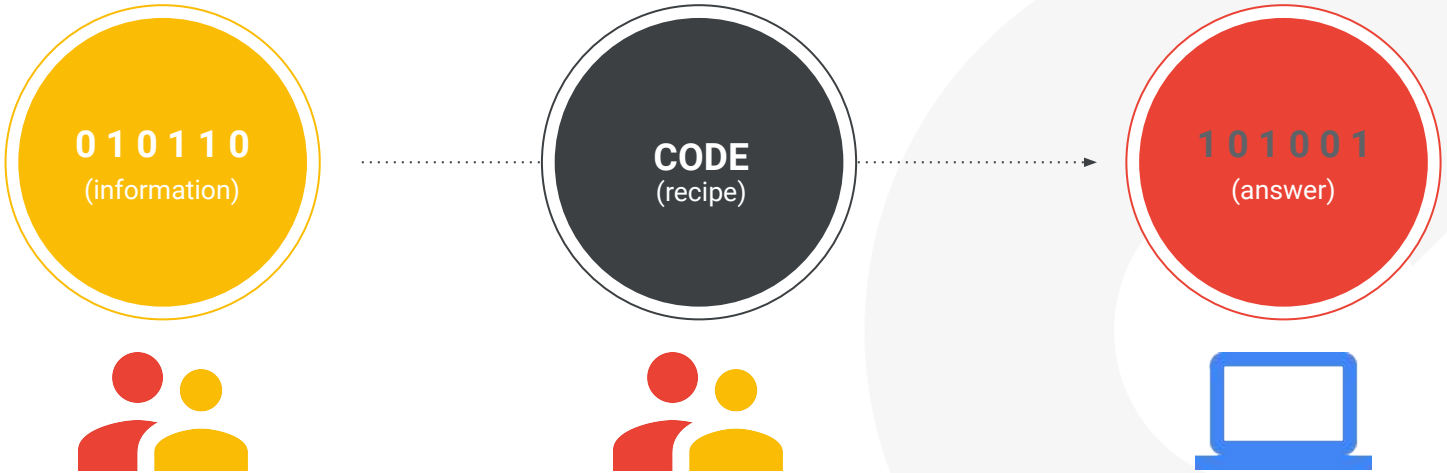
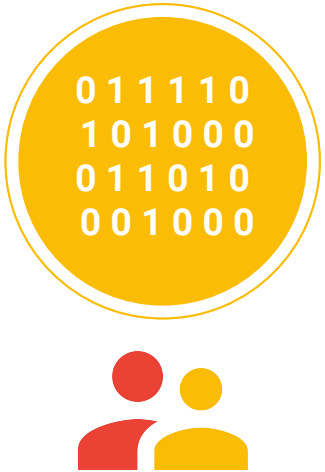
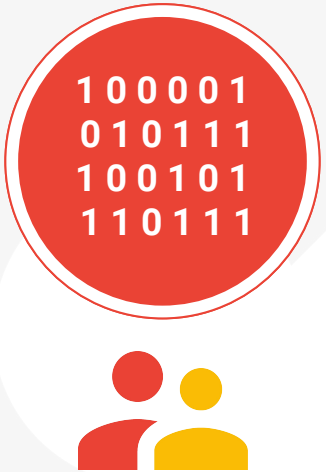


Machine learning: Recipe learned from data





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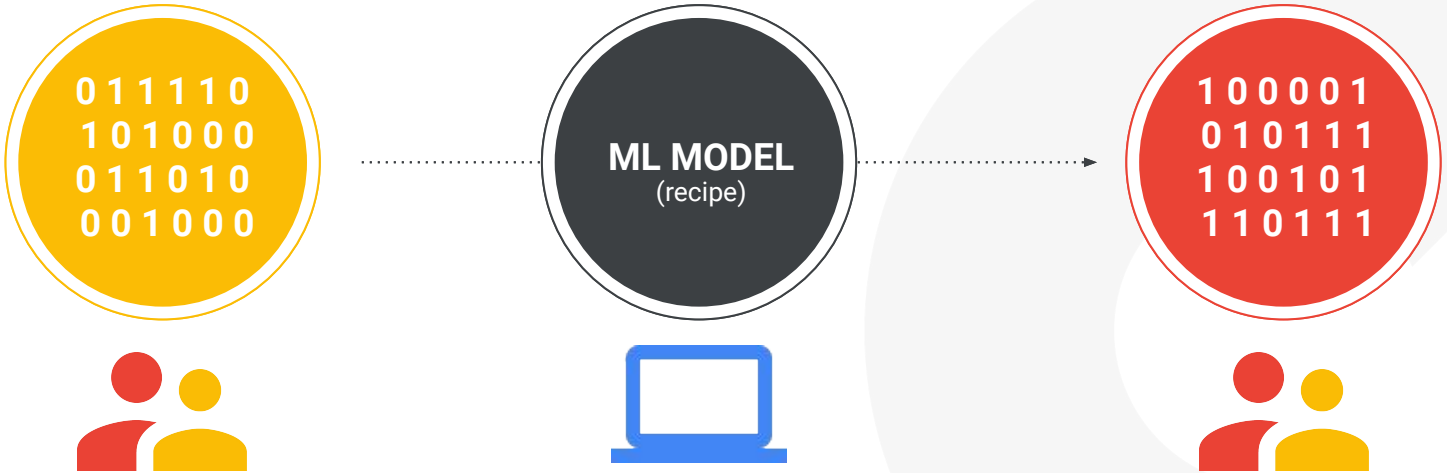
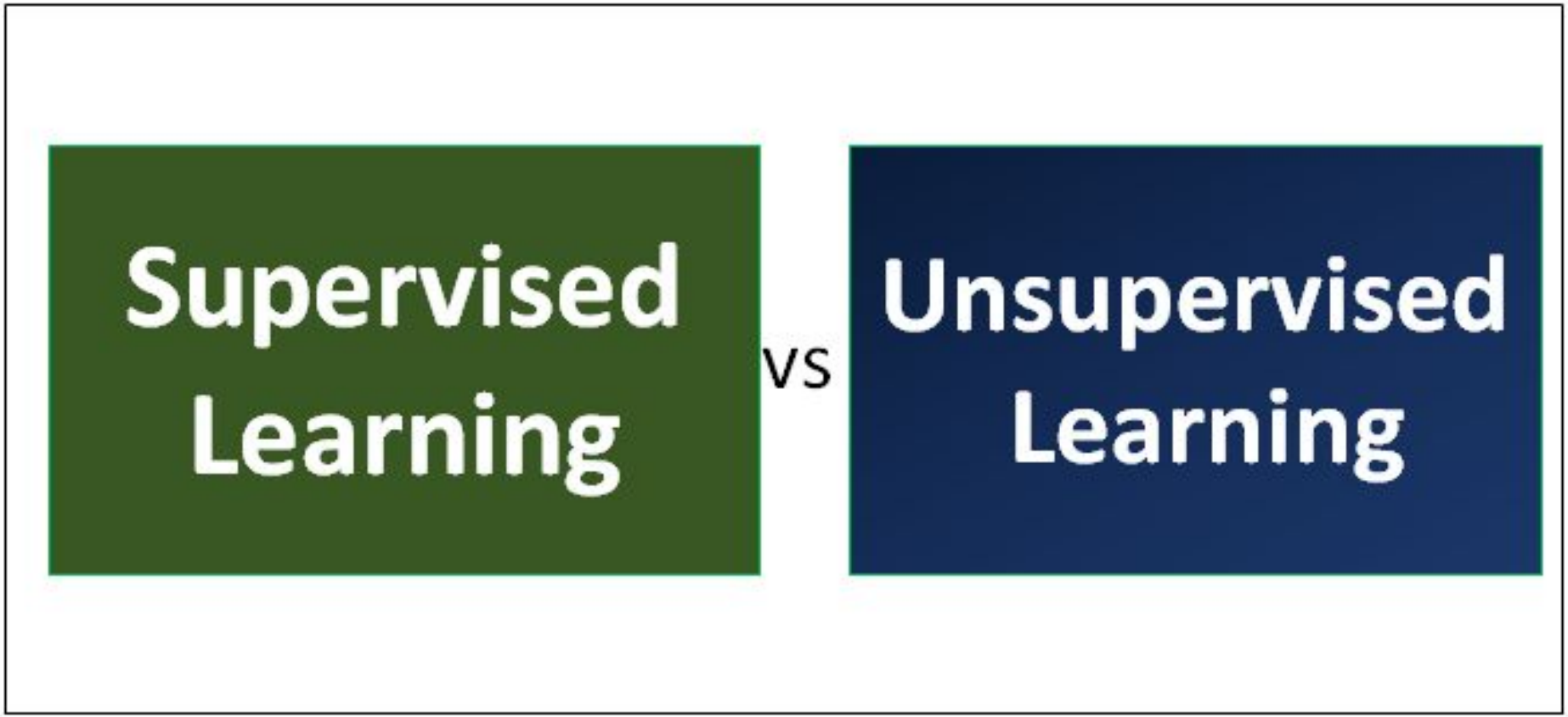
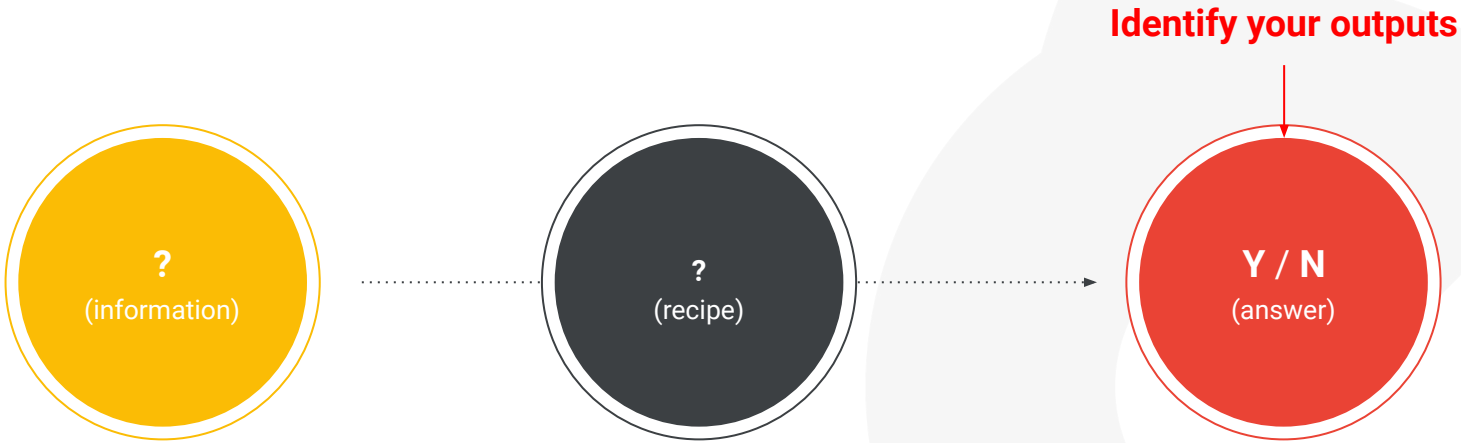
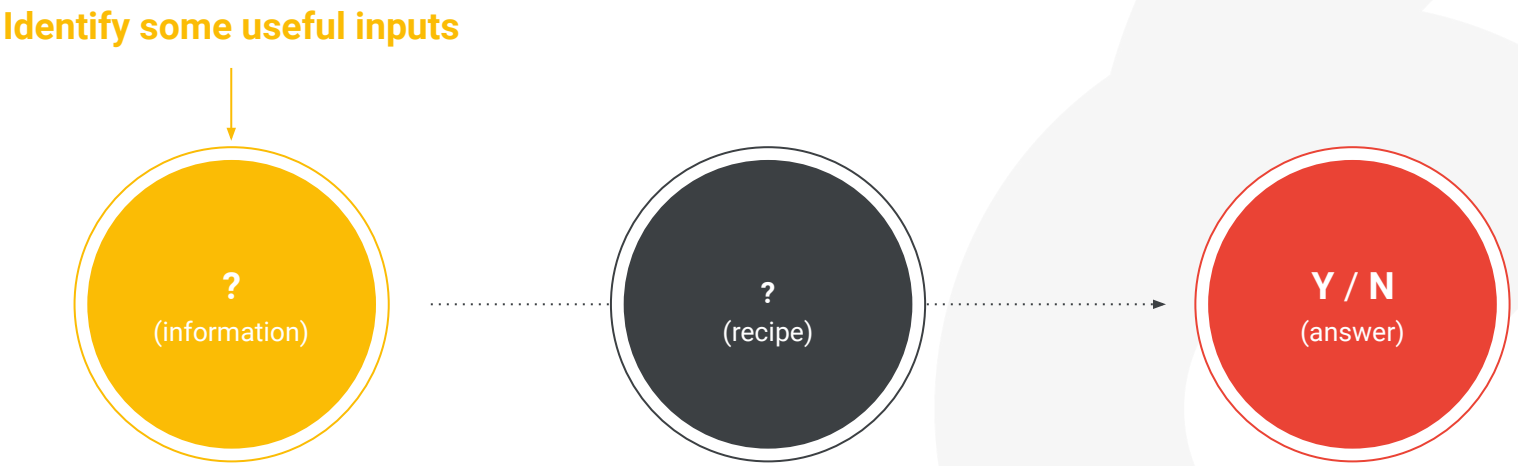



Supervised Learning
vs
Unsupervised Learning

Define our outputs



Get some data to learn from



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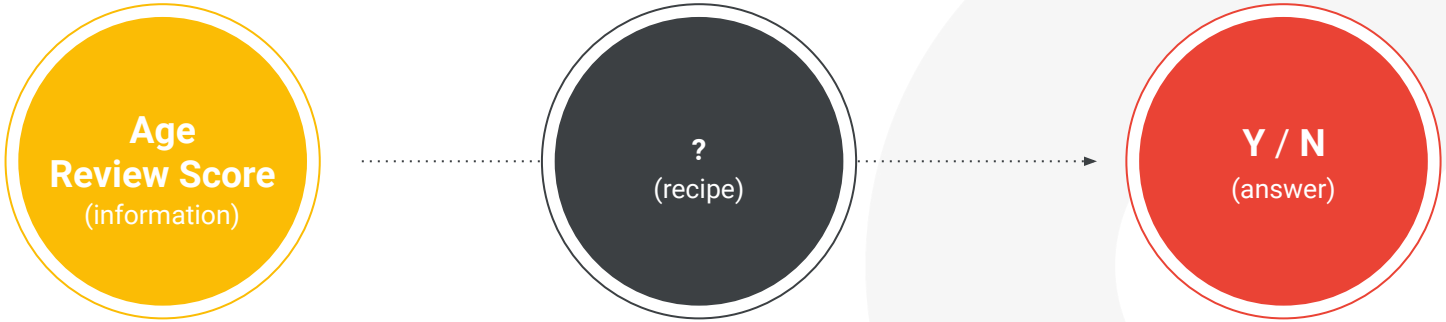
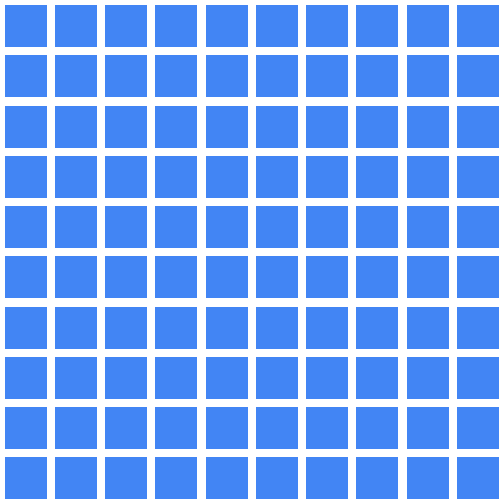
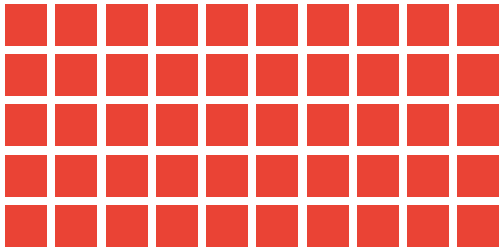


Split your data



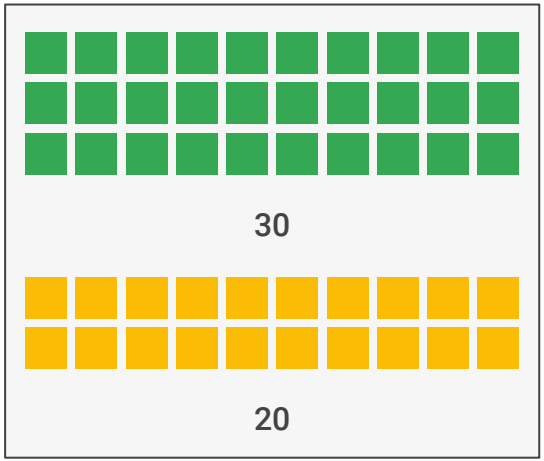
Training set

Fitting the model



Validation set

Soft interim evals

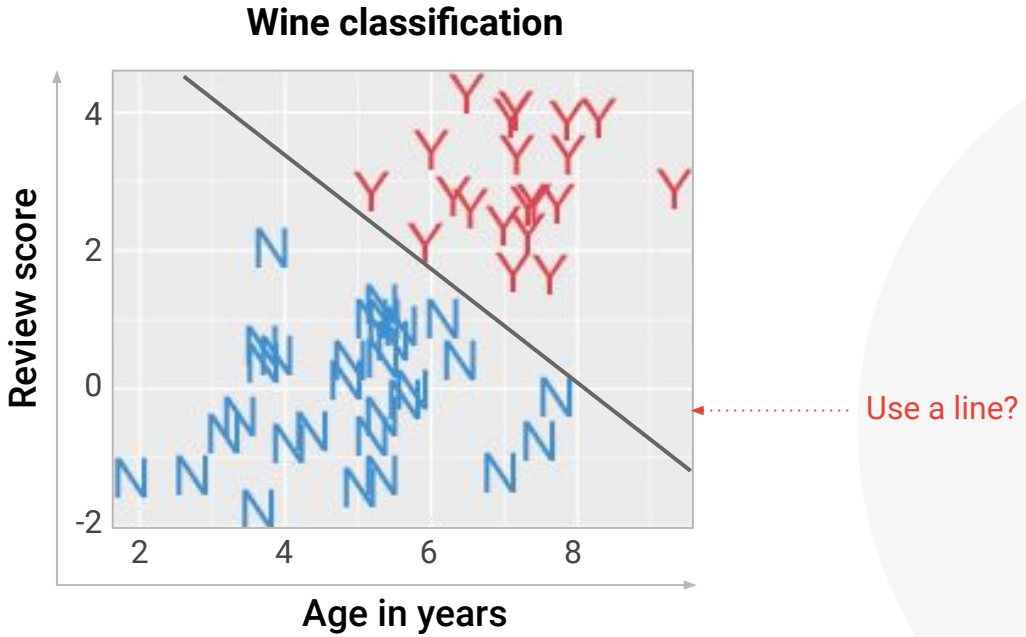


Test set

Rigorous final eval

Data inputs

Use a line?


Wine classification
Review score
4
2
0
-2
2
4
6
8
Age in years
Use a line?

Train your solution

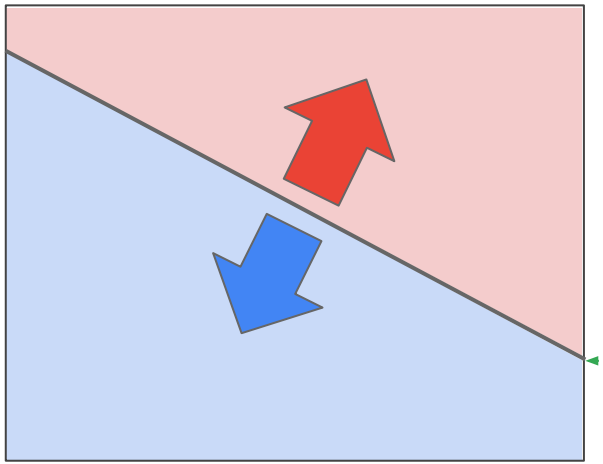
Algorithm selection:

Support Vector Machine

Decision Tree

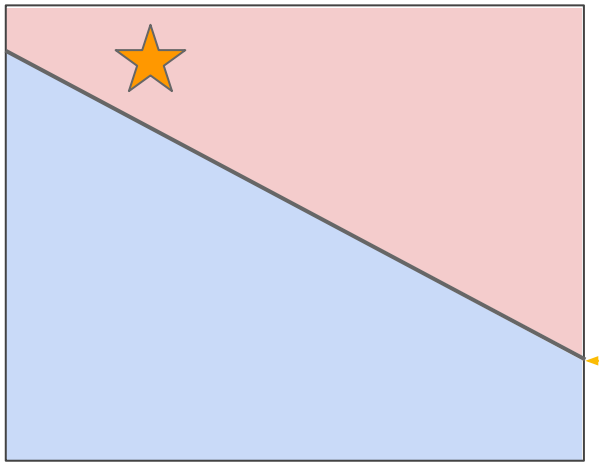
Neural Network

Train your solution



Get model (recipe)

New Data



Decision Tree Training

Algorithm selected:

Decision Tree

Run ML algorithm

Decision Tree Training

Algorithm selected:

Decision Tree

Run ML algorithm

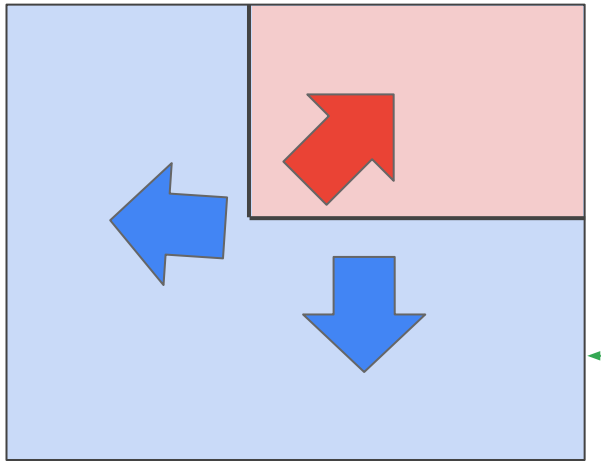
Decision Tree Training

Algorithm selected:

Decision Tree

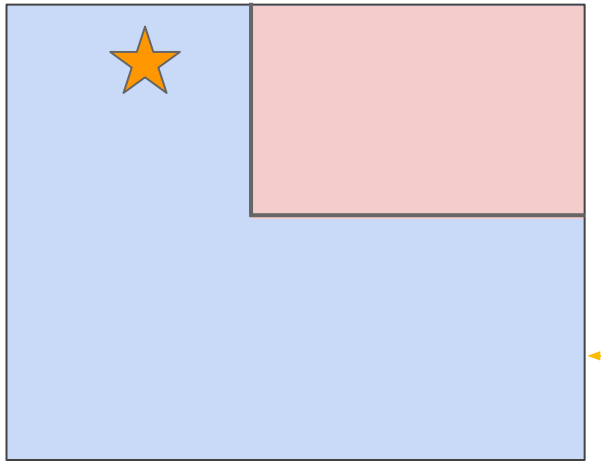
Run ML algorithm

Decision Tree Model



Get model (recipe)

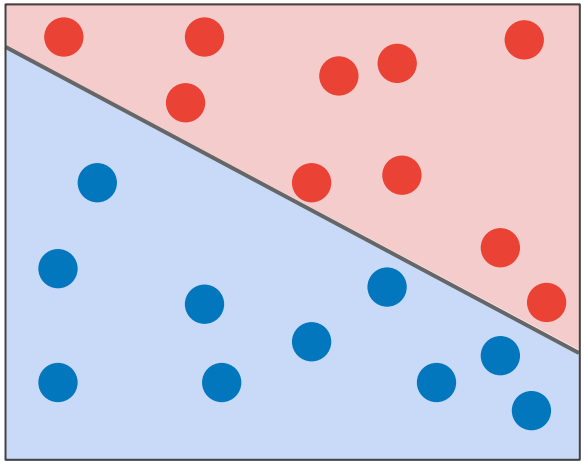
Validate your solution



New data? Use recipe!

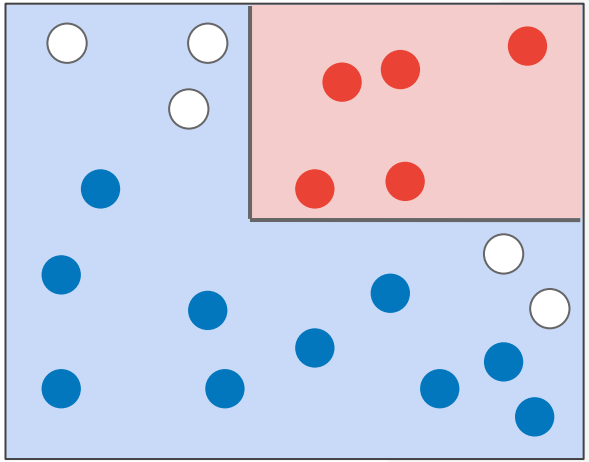
Get model performance

Support vector machine



Test Accuracy: **100%**

Decision tree



Test Accuracy: **75%**

EE Classifier Limitations

- Good for about 100mb of training data, so with about 100 bands that gives about 200k points
- Feature collection **cannot** be sparse
- Generally small number of classes

Follow along!

- https://code.earthengine.google.com/?accept_repo=users/akarbasi/simple_classifier

Common EE Errors

- Out of memory error
  - Usually happens when tile is too large. When you sample from an image you're sampling from a tile. In Earth Engine each tile 1000x1000 so with a lot of bands that can be too much memory for us to handle.

- Computation timed out
  - Can happens if classifying the table/image takes too long

- Request too large
  - Too large of a training dataset or the model created is too large.

Data inputs - Clustering

Data inputs - Clustering

Links

- ML Overview: bit.ly/quaesita_emperor
  - By Cassie Kozyrkov
- Classifier examples:
  - http://code.earthengine.google.com/?accept_repo=users/akarbasi/simple_classifier