



EE Classifiers and Regression

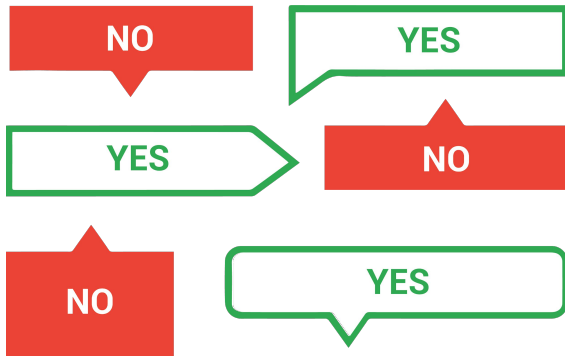
Arian Karbasi

Agenda

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



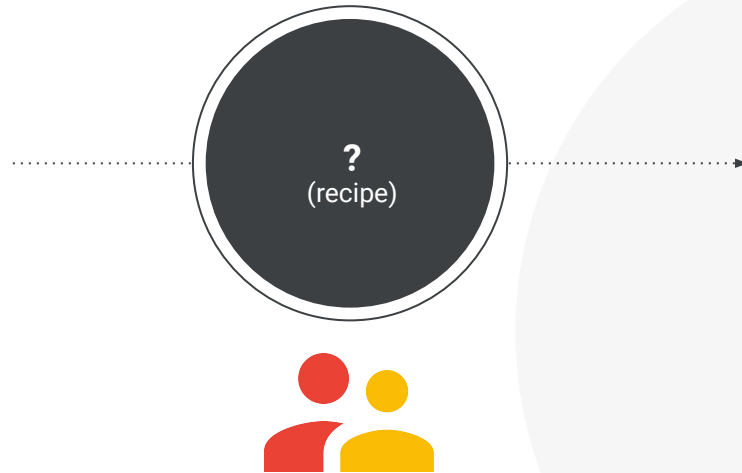
Machine learning is an approach to making lots of small decisions



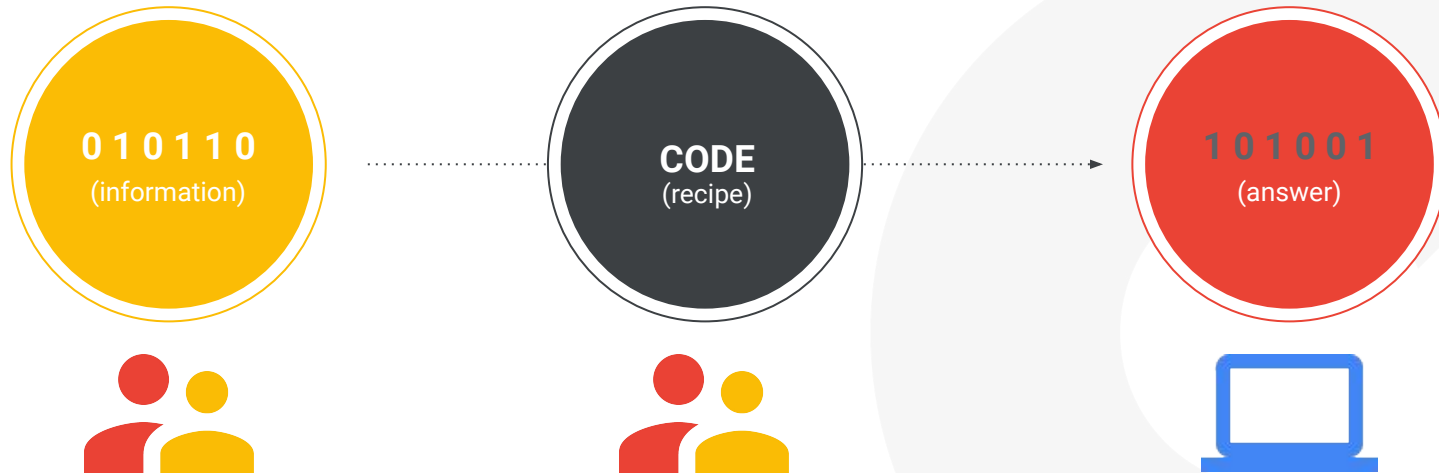
Machine learning vs traditional programming



Traditional programming: Handcrafted recipe



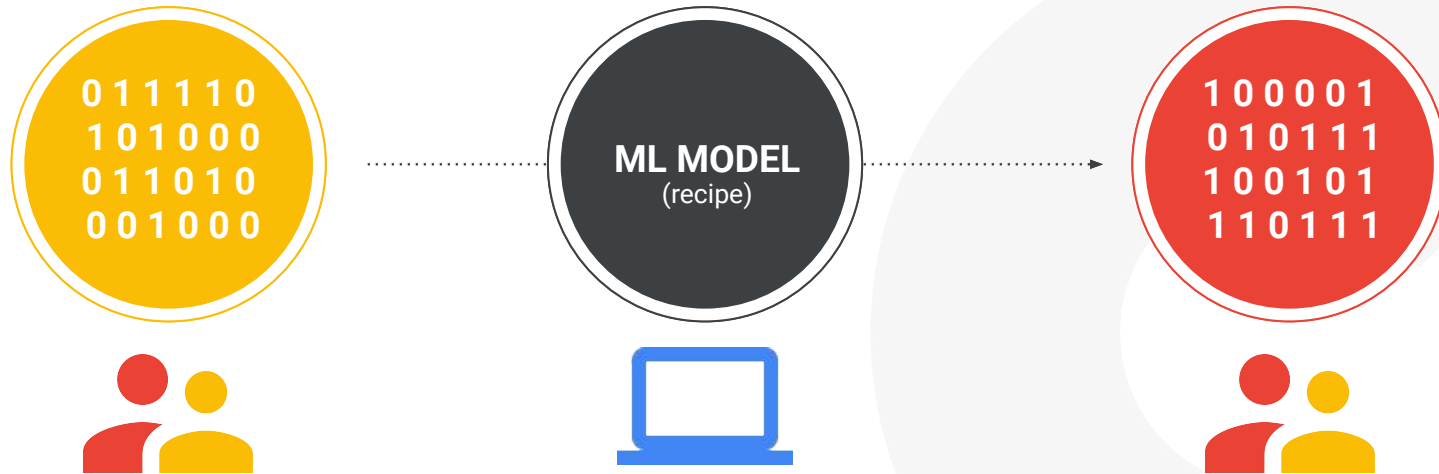
Traditional programming: Handcrafted recipe



Machine learning: Recipe learned from data



Machine learning: Recipe learned from data

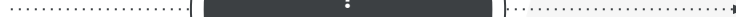
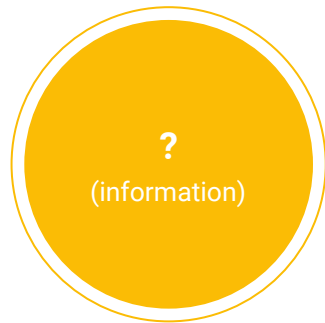


**Supervised
Learning**

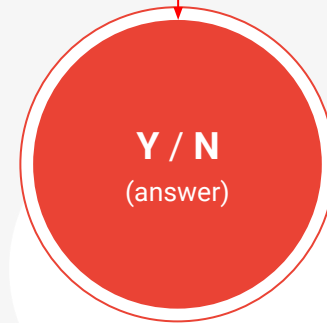
VS

**Unsupervised
Learning**

Define our outputs

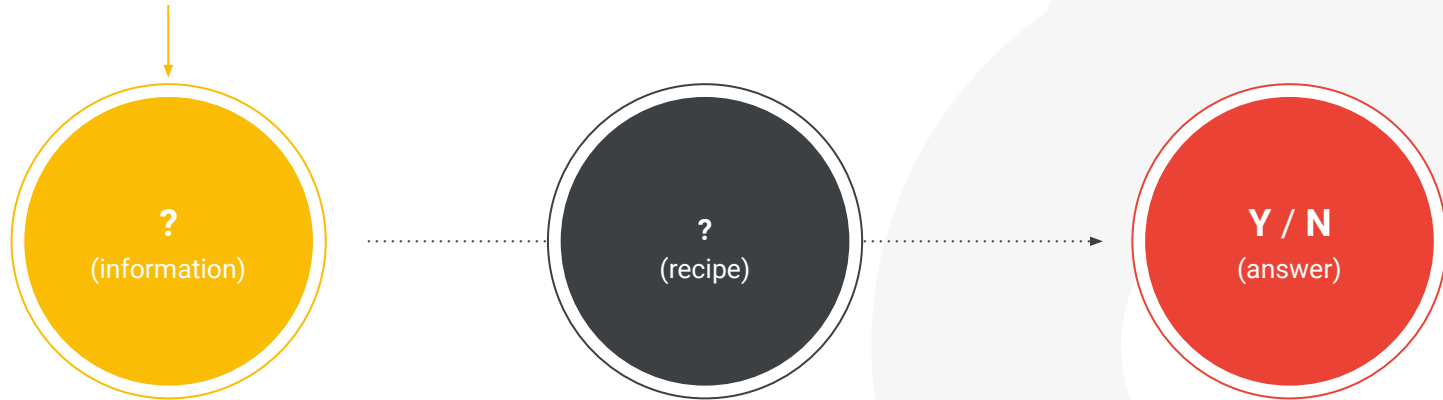


Identify your outputs



Get some data to learn from

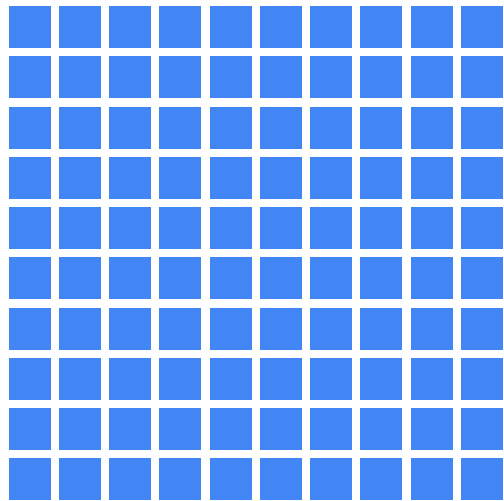
Identify some useful inputs



Get some data to learn from



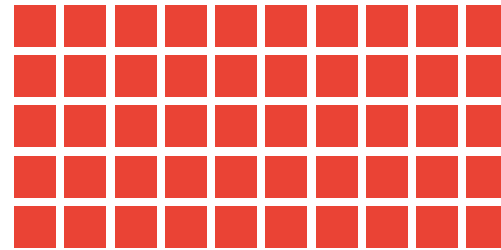
Split your data



100

Training set

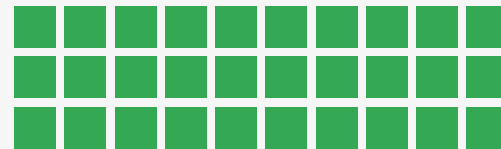
Fitting the model



50

Validation set

Soft interim evals



30

Test set

Rigorous final eval



20

Data inputs



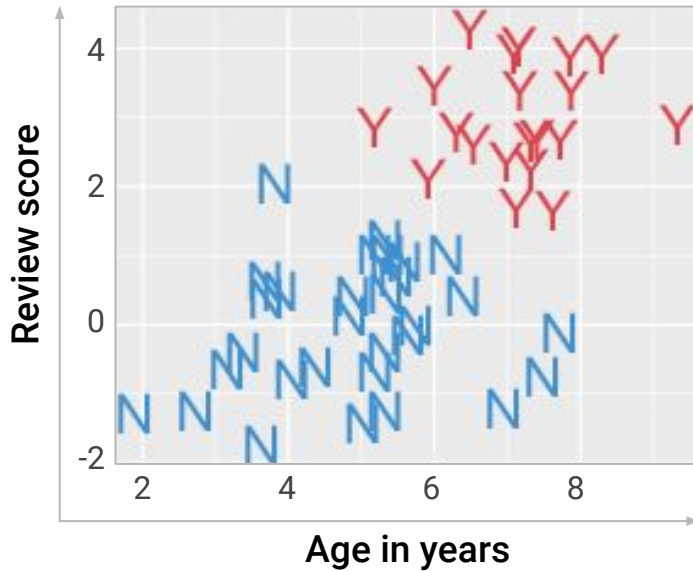
Use a line?






Use a line?

Train your solution

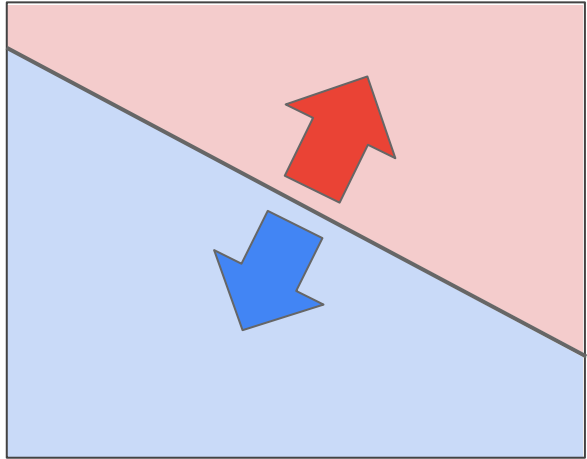
Wine classification



Algorithm selection:

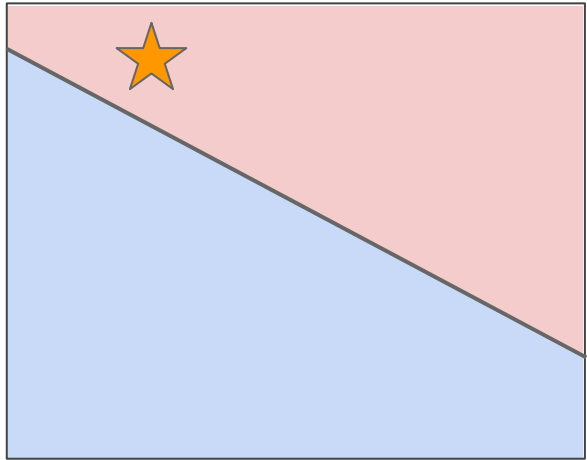
-  Support Vector Machine
-  Decision Tree
-  Neural Network

Train your solution



Get model (recipe)

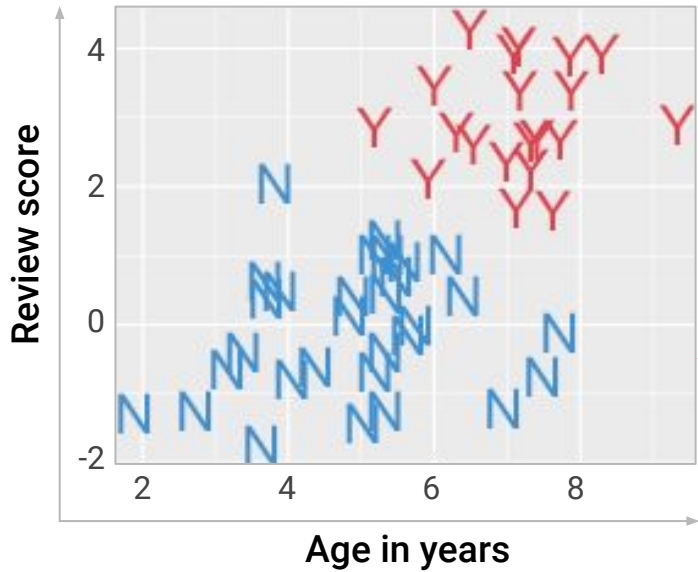
New Data



New data? Use recipe!

Decision Tree Training

Wine classification



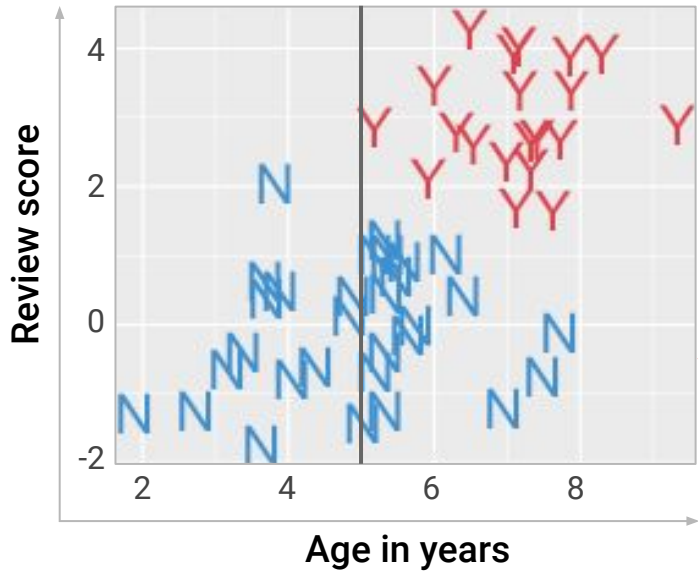
Algorithm selected:

Decision Tree

Run ML algorithm

Decision Tree Training

Wine classification



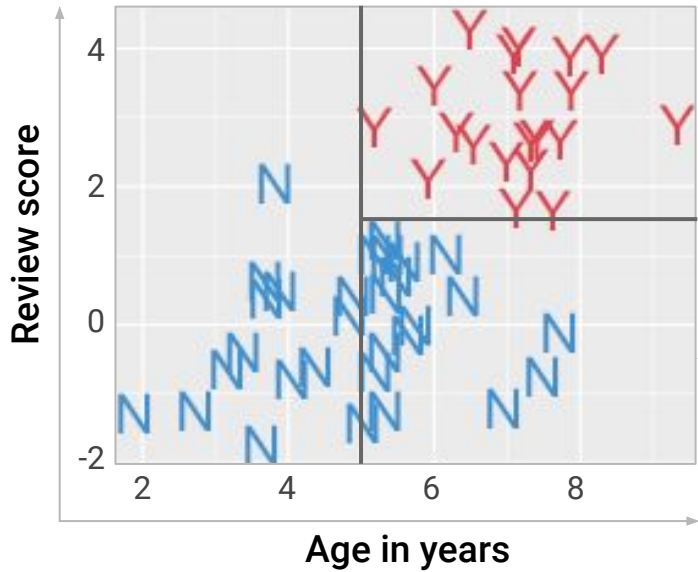
Algorithm selected:

Decision Tree

Run ML algorithm

Decision Tree Training

Wine classification

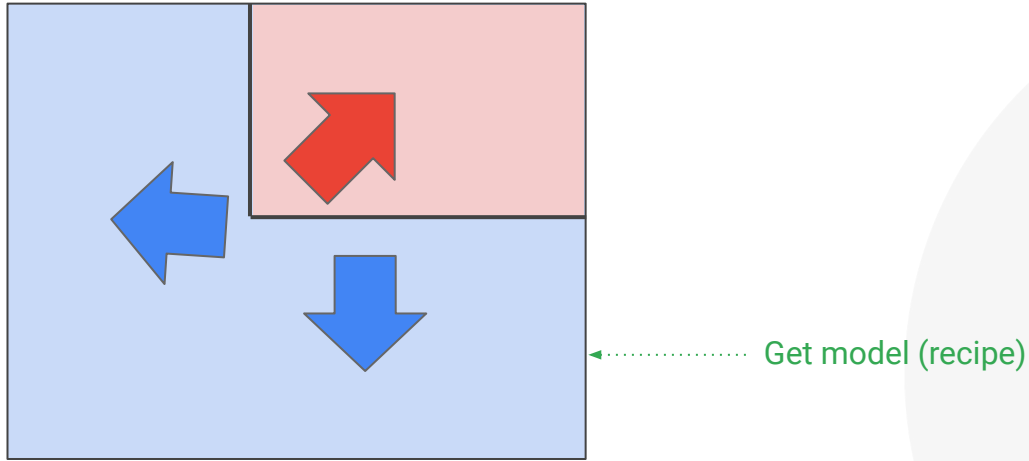


Algorithm selected:

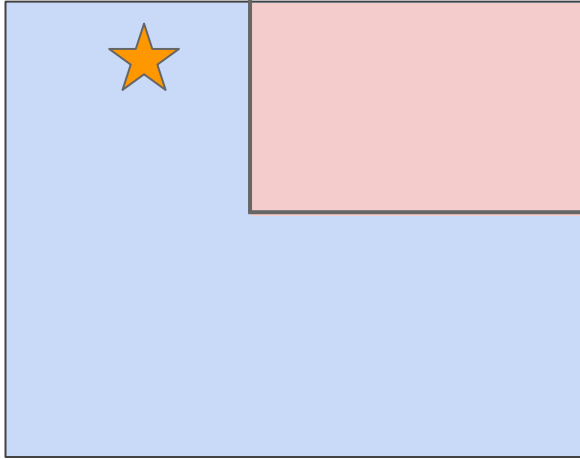
Decision Tree

Run ML algorithm

Decision Tree Model



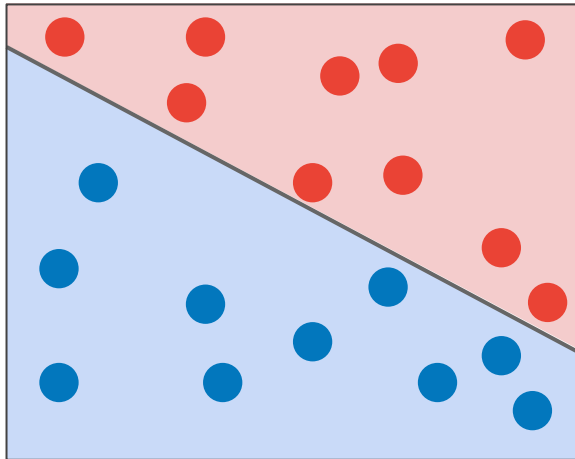
Validate your solution



← New data? Use recipe!

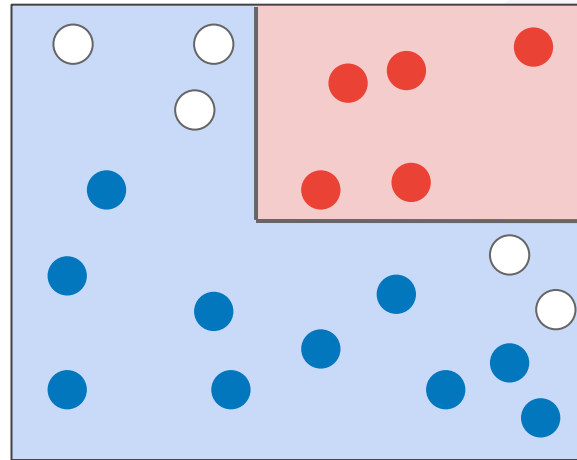
Get model performance

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

