Tensor in the Sky with CloudML

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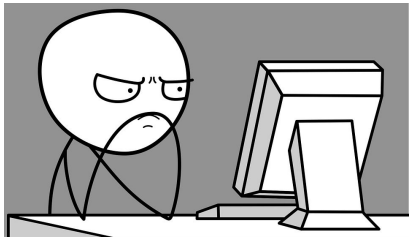
WHY ?

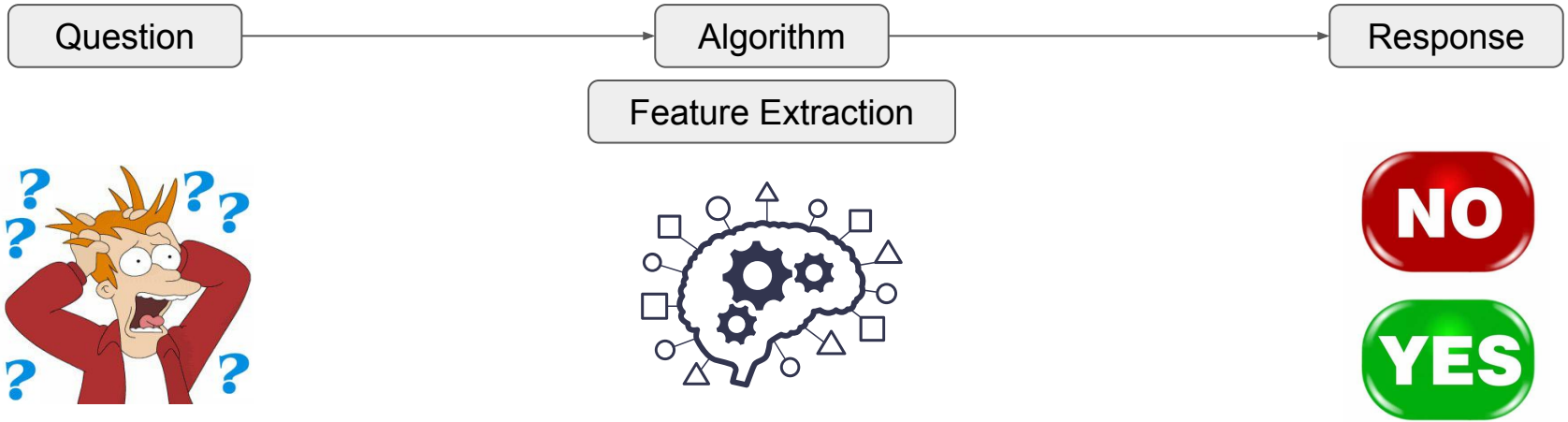
Deep Learning

Classic Machine Learning

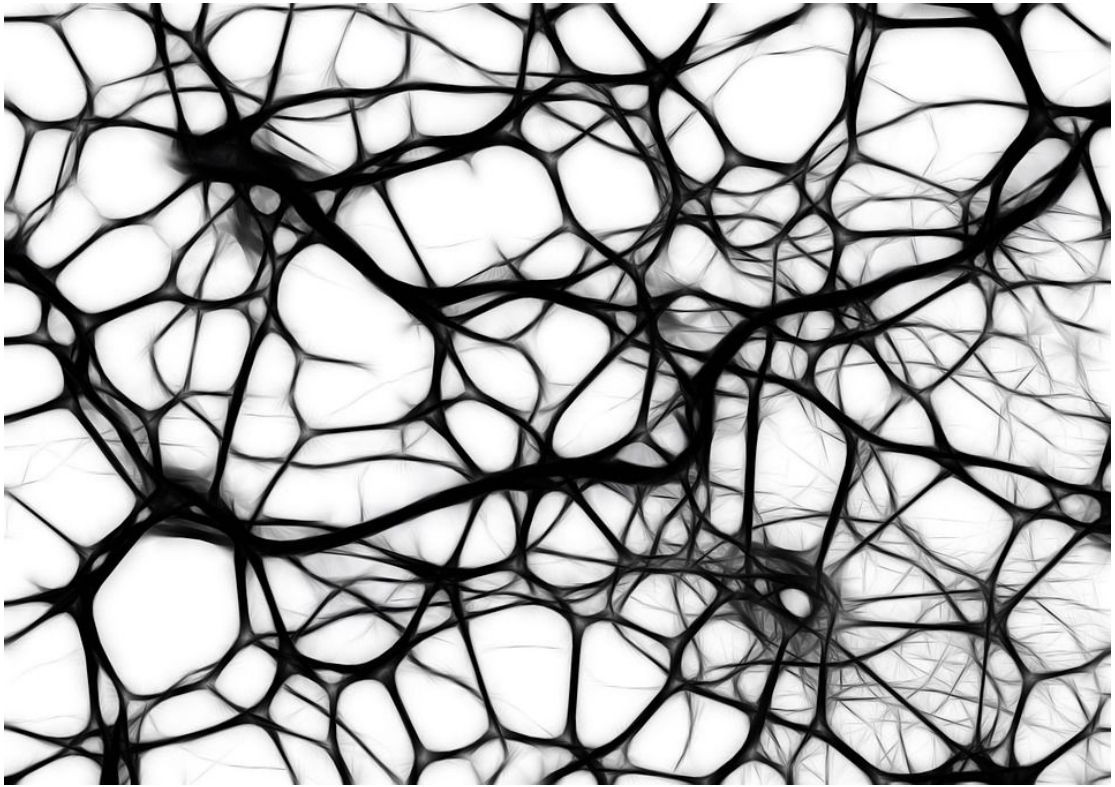
Question → Feature Extraction → Algorithm → Response



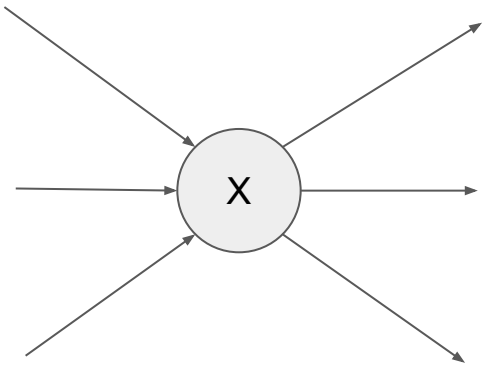
Deep Learning



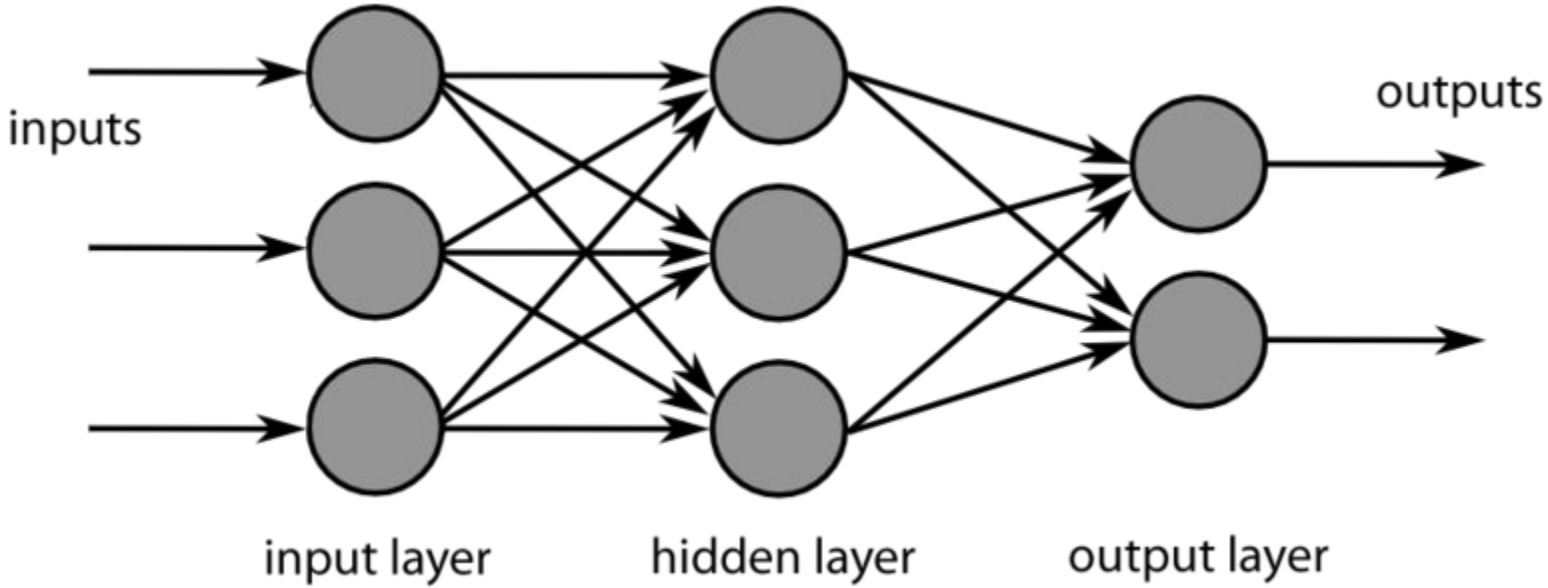
Neural Networks



Artificial Neural Networks



Artificial Neural Networks



WHY ?

Cloud

Google CloudML

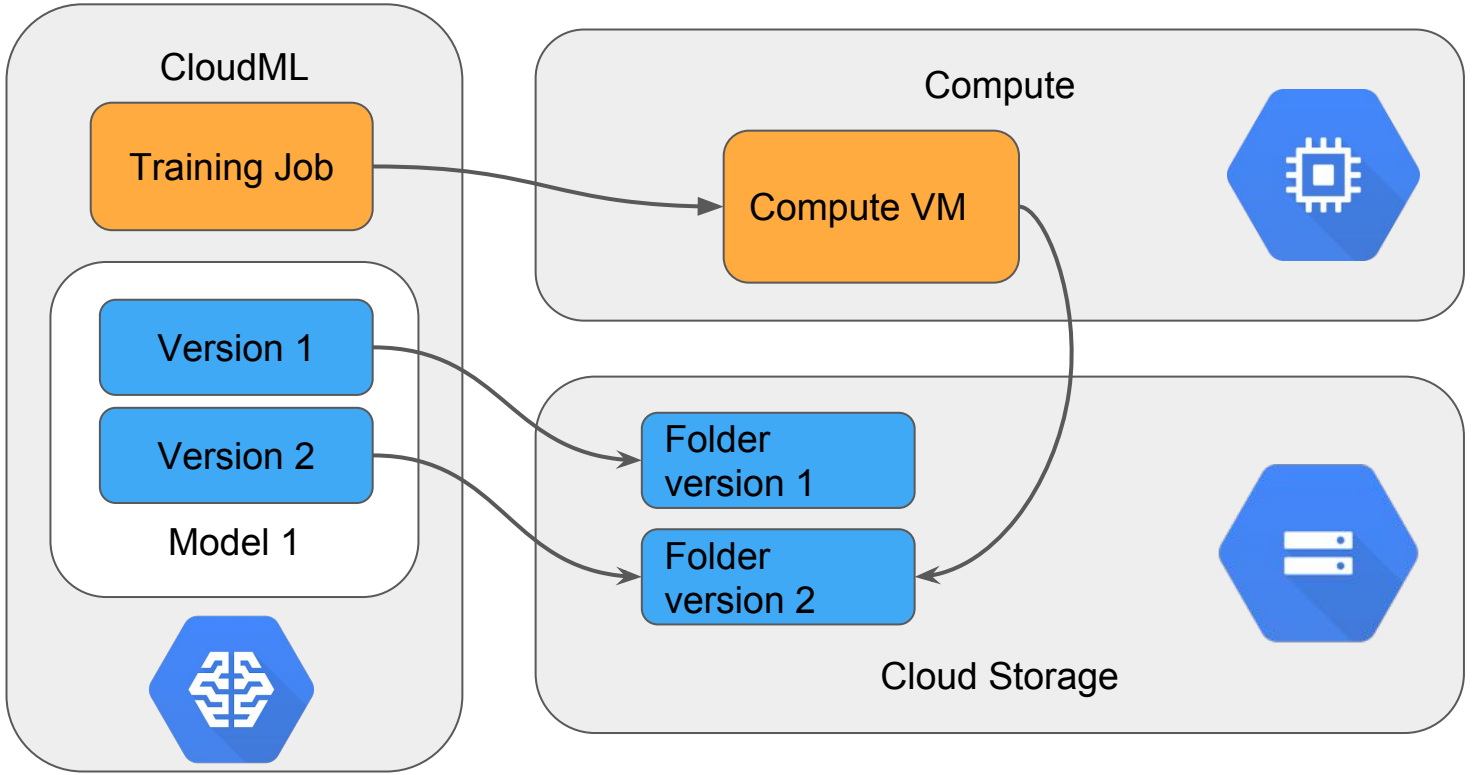
Machine Learning Managed Service

- ML Frameworks (beta) : scikit-learn, XGBoost
- DL Frameworks : Tensorflow, Keras

What you can do

- Train
- Predict

Google CloudML



WHY ?

Use Case


Heat the Neurons of Your Smartphone with Deep Learning
Qian Jin
Yoann Benoit
Sylvain Lequeux
XebiCon'17


I'M GOING ON AN
ADVENTURE
memegenerator.net

Local Mode

At least, it'll work

Included into Tensorflow & Keras

There are pre-trained models

- Save time for training

Param count approximation

- InceptionV3 : 23M
- VGG16 : 138M

Adapted architecture

- Convolutional
- MaxPooling
- Recurrent
- ...


TIME TO DEMO
LOCAL PREDICTIONS
imgflip.com

Export model

Or How to Reuse

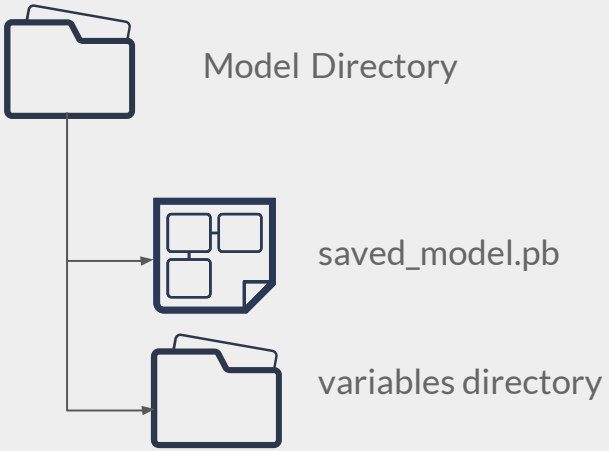
Weight stored in-memory

- Need to retrain each time you start
- Non-deterministic behaviour

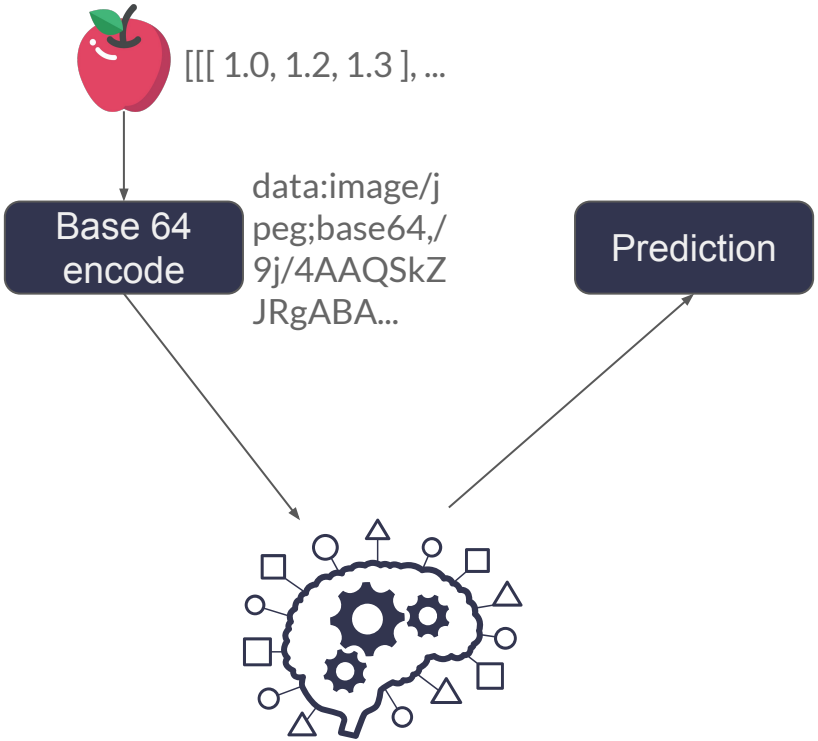
Use Protobuf format to store model

- Google's data exchange format
- Stores weights and architecture

protobuf
Protocol Buffers



Export model




IT'S DEMO TIME
MODEL EXPORT
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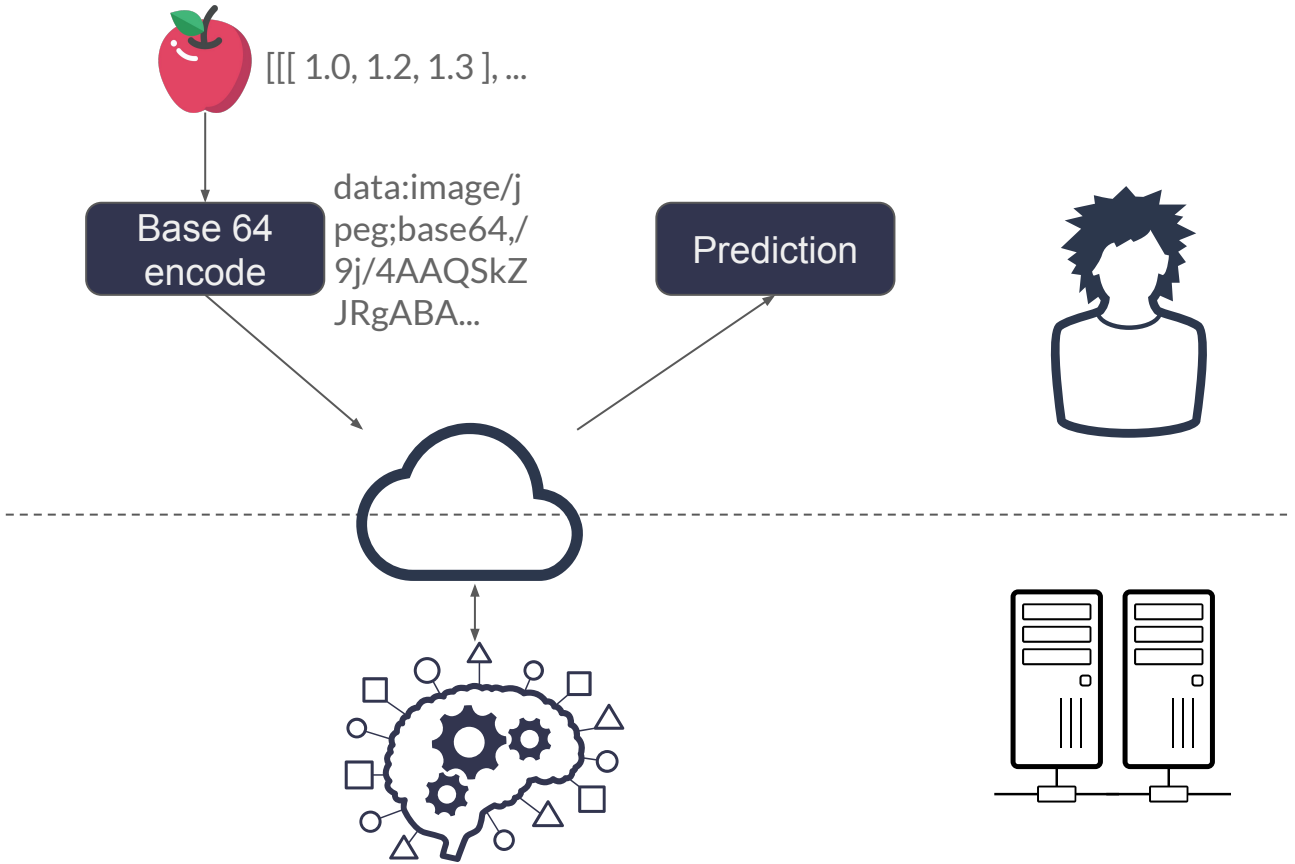
Serving In the Cloud

No diamonds, sorry

Serving




TIME TO DEMO
CLOUD SERVING
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Google functions

Proxify HTTP requests

Perform controls :

- Authentication
- Bandwidth controls
- ...

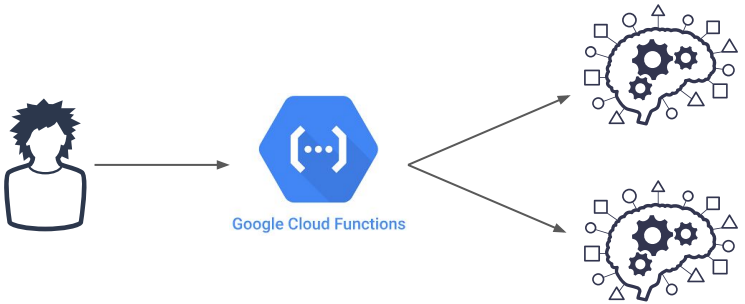
Transform data

- Input preprocessing
- Output formatting

Google functions

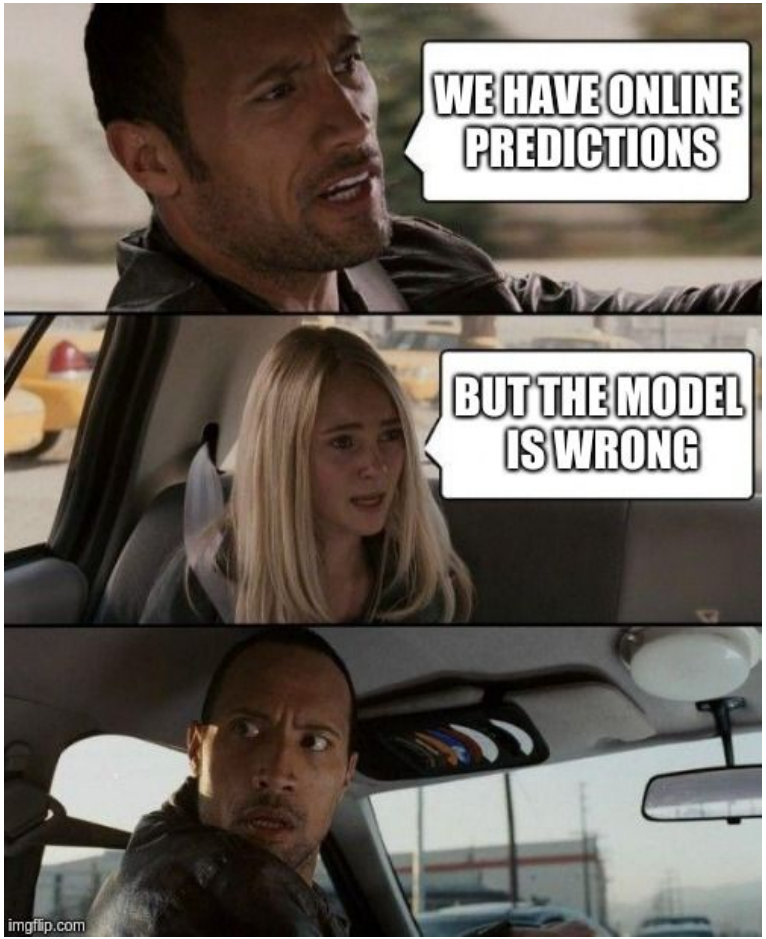
A/B test your models

Implements A/B testing logic inside this function



Learning In the Cloud

How about Magritte ?


WE HAVE ONLINE PREDICTIONS
BUT THE MODEL IS WRONG
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Transfer learning [...] is a research problem in machine learning that focuses on storing knowledge gained while solving one problem and applying it to a different but related problem.

Transfer learning

Retraining without retraining

First layers learn basic features

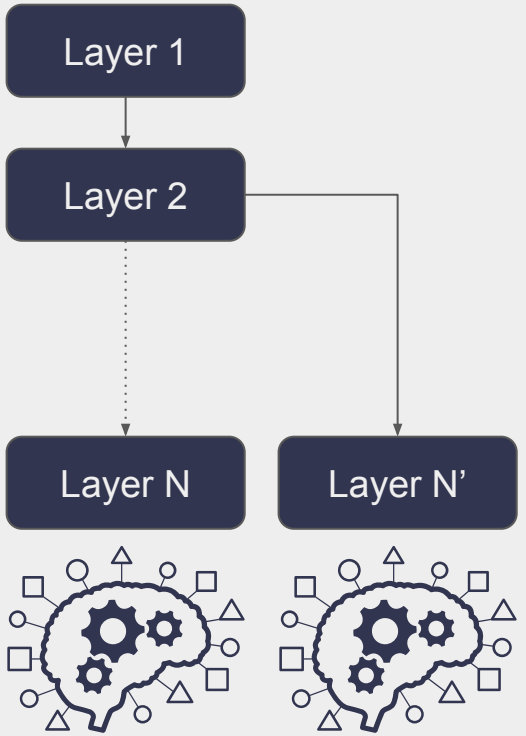
- Lines
- Colors
- ...

End layers learn complex features

- Objects
- Complex shapes
- ...

Transfer learning is 2-steps :

- Freeze first layers
- Train new end layers



Online training

Infinite power

- Define a setup.py file
- Define a config.yml file
  - This could be done directly in step 3 by passing args
  - Defines CPU/GPU/TPU usage
  - Defines runtime version
  - ...
- Run it
  - Using gcloud command line
  - Use -- to separate gcloud args from your job's args

```
(xke-cloudml) root@b4dc5ee1316c:/opt/demo# gcloud ml-engine jobs submit training
 $JOB_NAME \
>      --job-dir $OUTPUT_PATH \
>      --runtime-version 1.5 \
>      --module-name trainer.task \
>      --package-path trainer/ \
>      --region europe-west1 \
>      --scale-tier basic-gpu \
>      -- \
>      --num-epochs 3 \
>      --steps-per-epoch 3 \
>      --data-project $PROJECT_ID \
>      --data-bucket $BUCKET \
>      --data-path $DATA_PATH
```


OLD MAN YELLS AT CLOUD
TIME TO ALMOST DEMO
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So, what ?

Conclusions : 2 for 1


ONE DOES NOT SIMPLY
DO DATA SCIENCE
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Wet Paint
NO FOOLING
THIS PAINT IS WET


REAL MACHINE LEARNING CD
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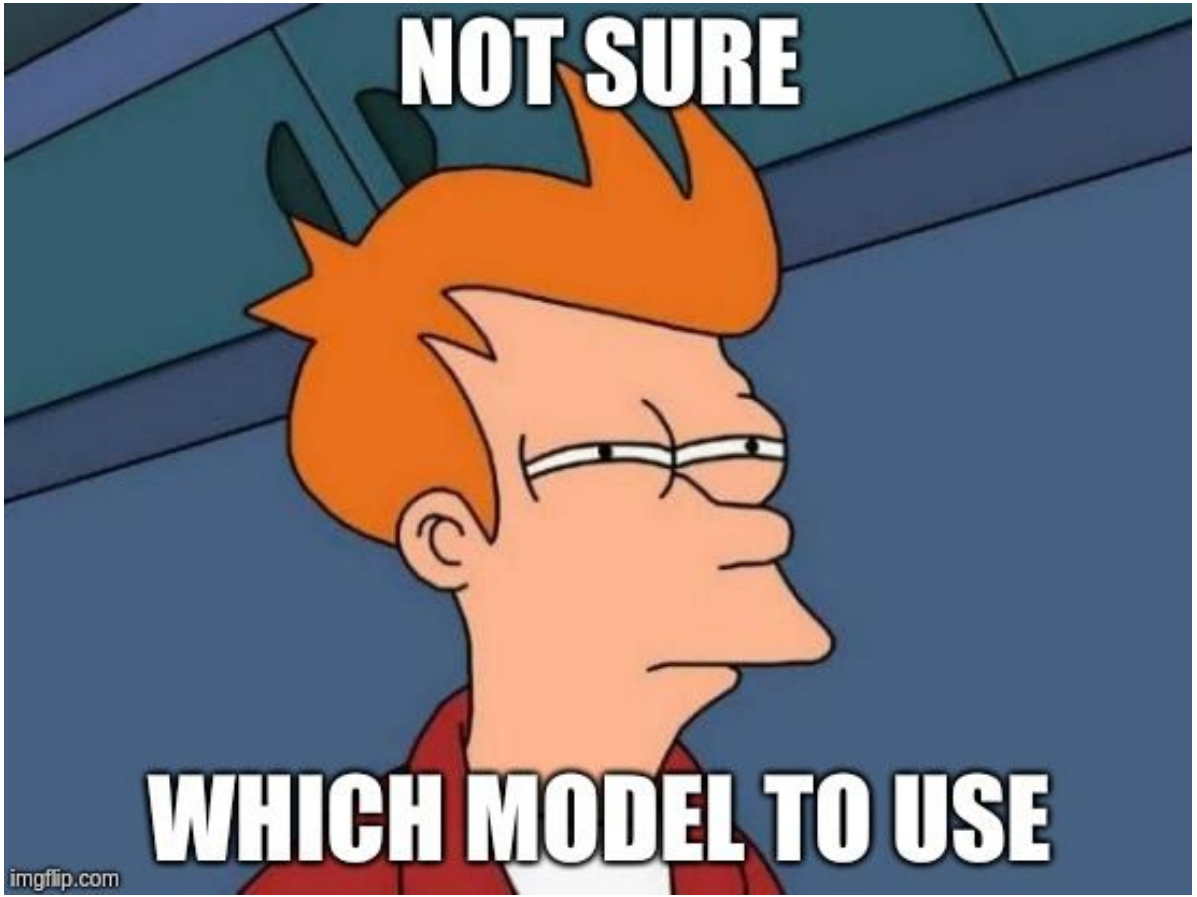
NOT SURE
WHICH MODEL TO USE
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Thank you

https://github.com/slequeux/xke-cloudml