

Core ML Relative Sessions in WWDC18

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Core ML Relative Sessions

703 - Introduction Create ML	34 min
708 - What's new in Core ML - Part 1	37 min
709 - What's new in Core ML - Part 2	34 min
712 - A guide to Turi Create	36 min
713 - Introducing natural language framework	38 min
716 - Object tracking in vision	34 min
717 - Vision with core ML	39 min

Total: 252 min

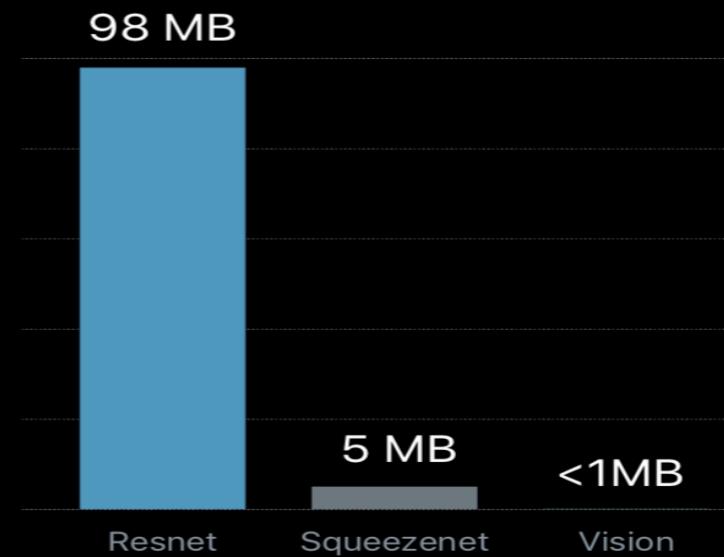
Features Not in This Talk

Session 703 - CreateML

There is another session of “Create ML with playground”, just after this session.

Session 708 & 709 - What's new in Core ML

Quantization (Create smaller ML model)
batch processing (Increase batch processing speed)
custom layer in CNN

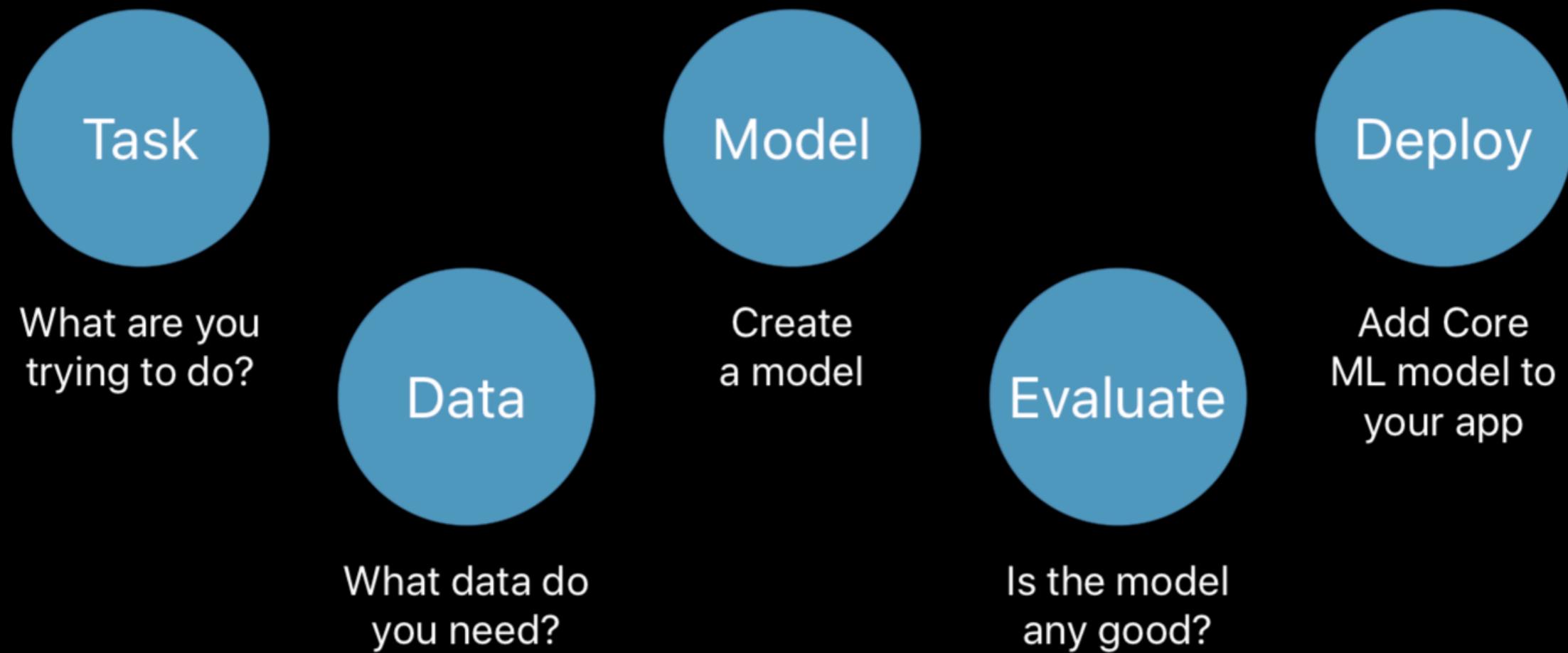


Session 716 & 717 - Visio

VNTranslationallImageRegistrationRequest (Detect the device is moving or not)
Tracking Object (Tracking algorithm is lighter than object detection)

Using structure data to train models

Basic 5 steps of ML

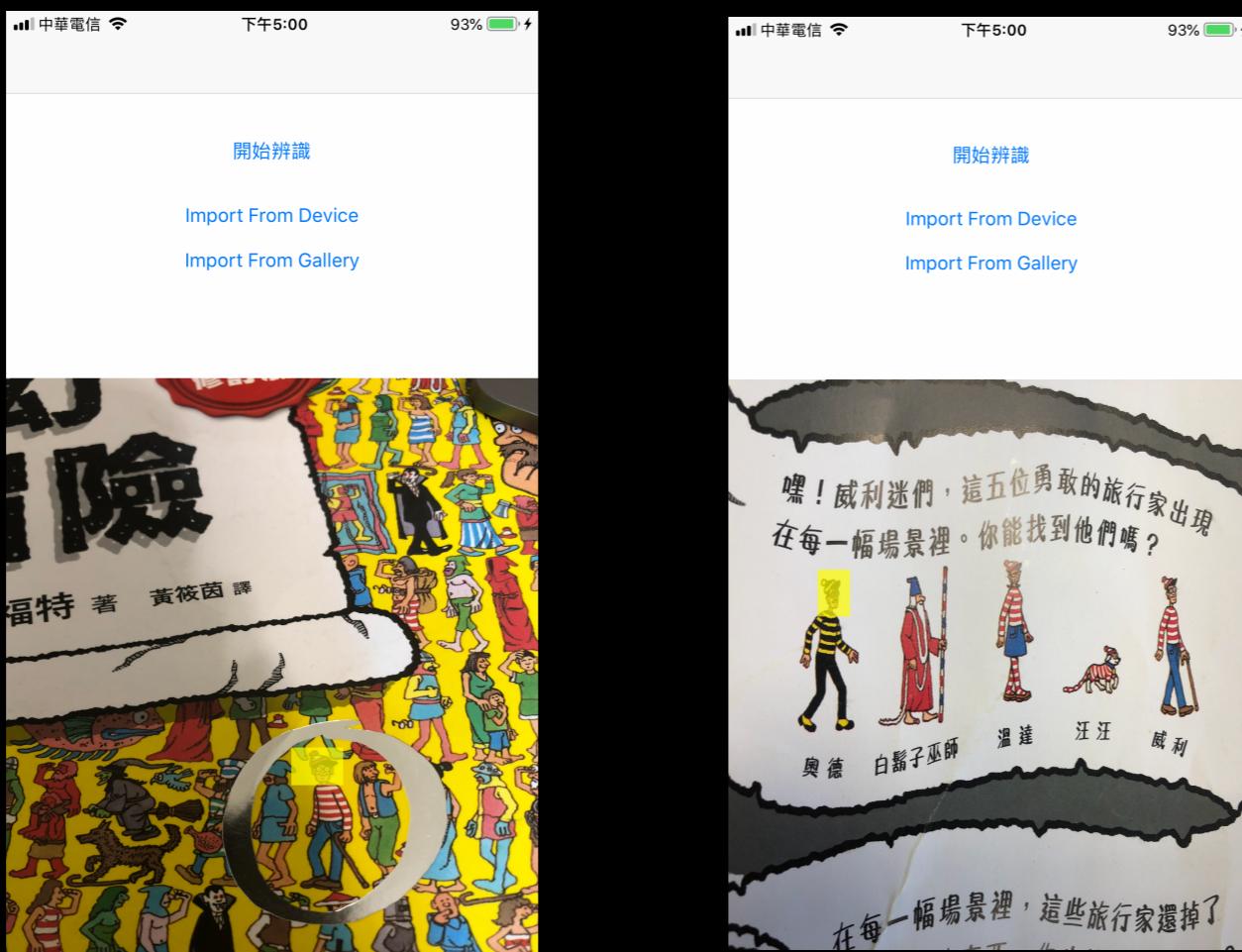


From WWDC's information, you only need 10 pics to train an image classifier model.

For object detection, you might need 40 pics.

App Demo

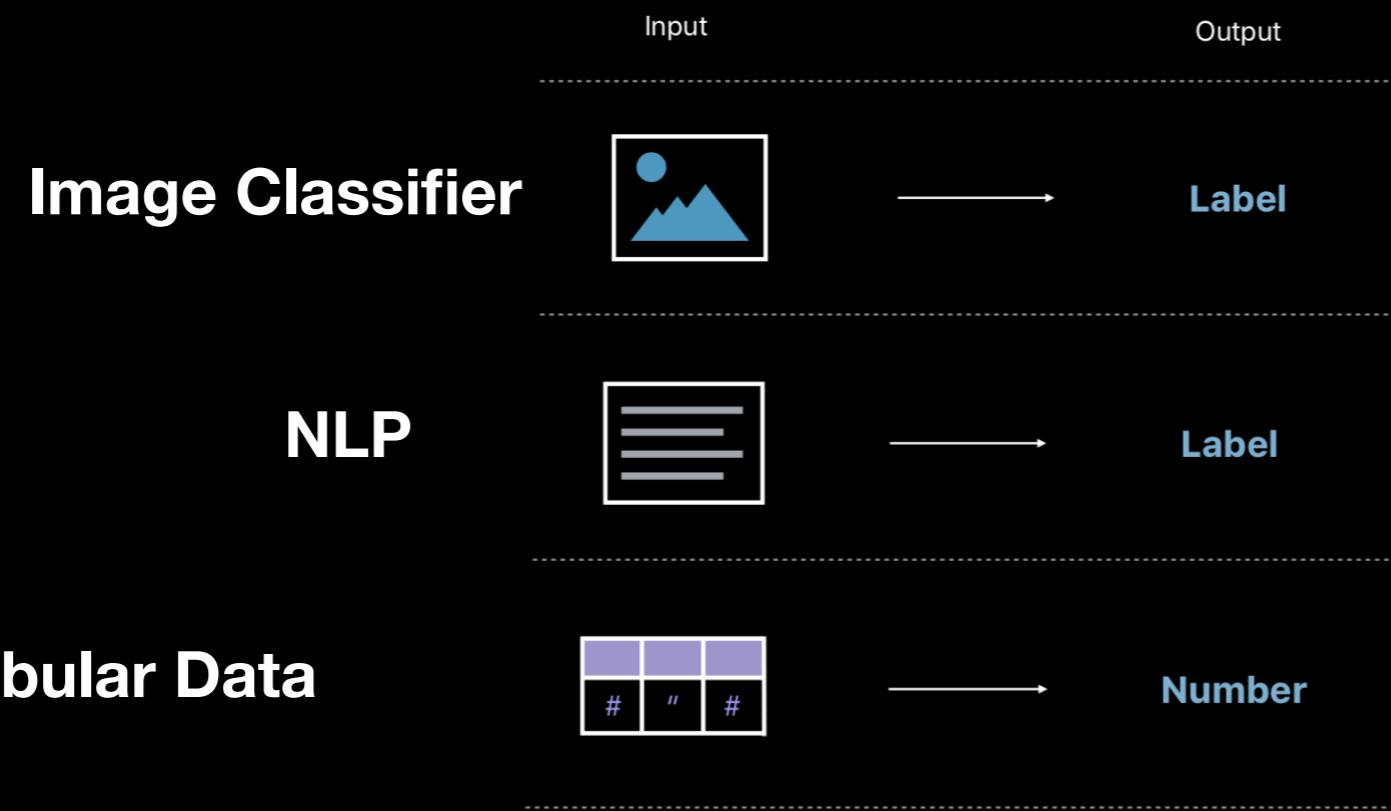
- Takeshiro Judgement App
- Style Transfer - Klimt style, Monet style, Vincent style, etc...
- Object Detection - Where's Wally?



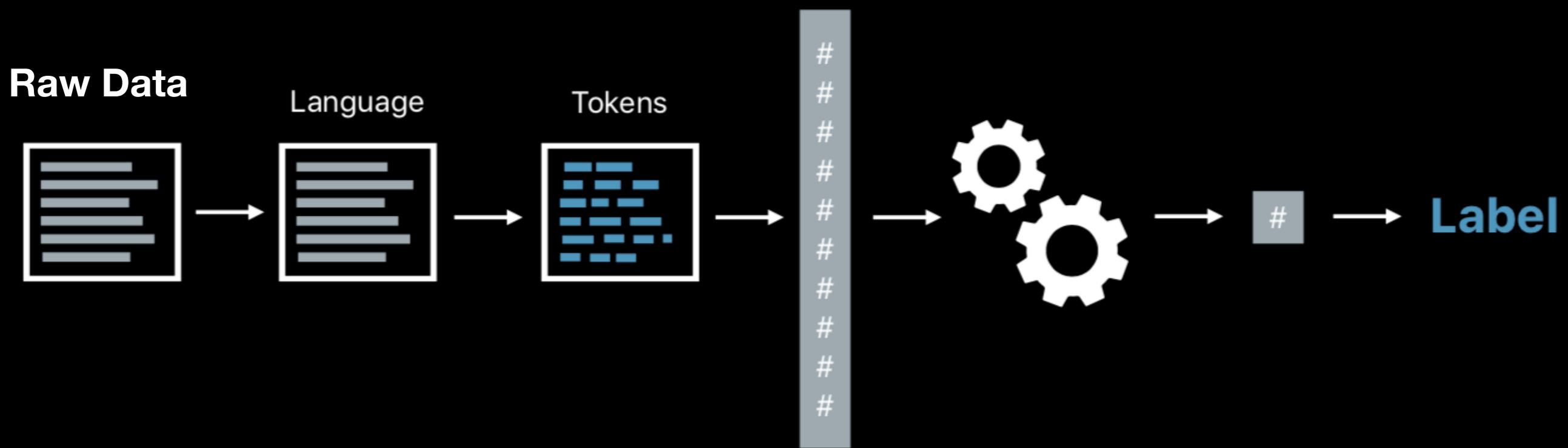
<https://github.com/MoonAndEye/CoreMLDemo>



Simple model creation
Tailored to your app
Leverages core Apple technologies
Powered by Mac



NLP



NLP - Language recognizing

```
30
31 let recognizer = NLLanguageRecognizer()
32 let testStr = "今日的臺北市只包含12個區，面積為271.7997平方公里"
33 recognizer.processString(testStr)
34 let lang = recognizer.dominantLanguage
35 let hypothesis = recognizer.languageHypotheses(withMaximum: 4)

    ▶({_rawValue "zh-Hans"}, value 0.0001164831774076447)
    ▶({_rawValue "ja"}, value 0.005327472928911448)
    ▶({_rawValue "zh-Hant"}, value 0.994546115398407)
```

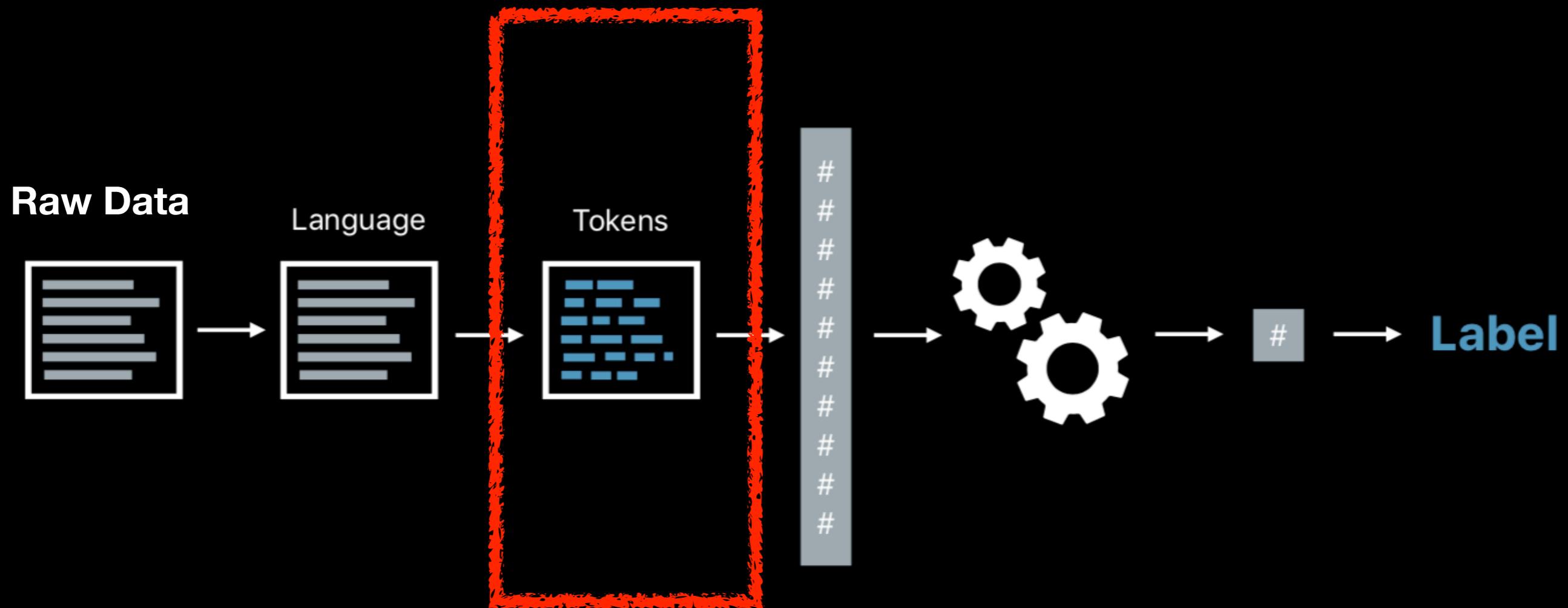
Using ISO 639-1 , JA means Japanese

The recognizer can't identify Malay and Indonesia

```
50
31 let recognizer = NLLanguageRecognizer()
32 let testStr = "sila berhati hati ruang di platform"
33 recognizer.processString(testStr)
34 let lang = recognizer.dominantLanguage
35 let hypothesis = recognizer.languageHypotheses(withMaximum: 4)

    ▶({_rawValue "hr"}, value 0.007782762870192528)
    ▶({_rawValue "it"}, value 0.9825760722160339)
    ▶({_rawValue "tr"}, value 0.005278028082102537)
    ▶({_rawValue "de"}, value 0.000978454714640975)
```

Tokens in Asia Language



All You Need Is NLTokenizer

The screenshot shows a Swift code editor with two panes demonstrating NLTokenizer. The left pane processes Chinese text, and the right pane processes Japanese text.

Left Pane (Chinese Example):

```
43 // Document, paragraph, sentence, word
44 let tokenizer = NLTokenizer(unit: .word)
45 let str = "下一個講者的演講一定很精采，對機器學習有興趣的朋友請留下來聽"
46 let strRange = str.startIndex ..< str.endIndex
47 tokenizer.string = str
48 // tokens 會輸出 Range<Set>,
49 let tokenArray = tokenizer.tokens(for: strRange)
50 for each in tokenArray {
51     print(each)
```

Output:

```
きょう
の
ぼく
に
げんかい
は
ない
```

Right Pane (Japanese Example):

```
43 // Document, paragraph, sentence, word
44 let tokenizer = NLTokenizer(unit: .word)
45 let str = "この戦争が終わったら、俺は故郷に帰って結婚するんだ"
46 let strRange = str.startIndex ..< str.endIndex
47 tokenizer.string = str
```

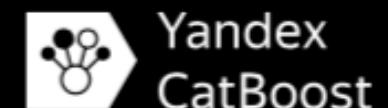
Output:

```
この
戦争
が
終
わっ
たら
俺
は
故郷
に
帰っ
て
結婚
する
んだ
```

<https://github.com/MoonAndE/NLTokenizer>

Famous ML Framework

IBM Watson®



^{dmk}
XGBoost



Keras

Caffe



LIBSVM

mxnet

What's is Turi Create

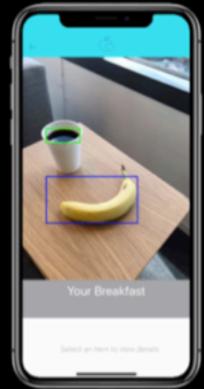
- It's a Python package, open source project. Let you make Core ML models easier than before.
- Easy to use, you don't have to be a ML expert.
- Let iOS developer can focus on APIs
- Cross platform (Mac, Linux)

- pip install turicreate (Mac already have Python 2.7)

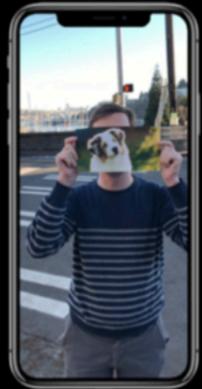
- Less than 20 lines of code

- Jupyter Notebook (Not necessary)

<https://github.com/apple/turicreate>



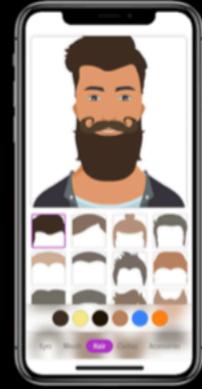
偵測並辨視物體



即時偵測



手勢操作



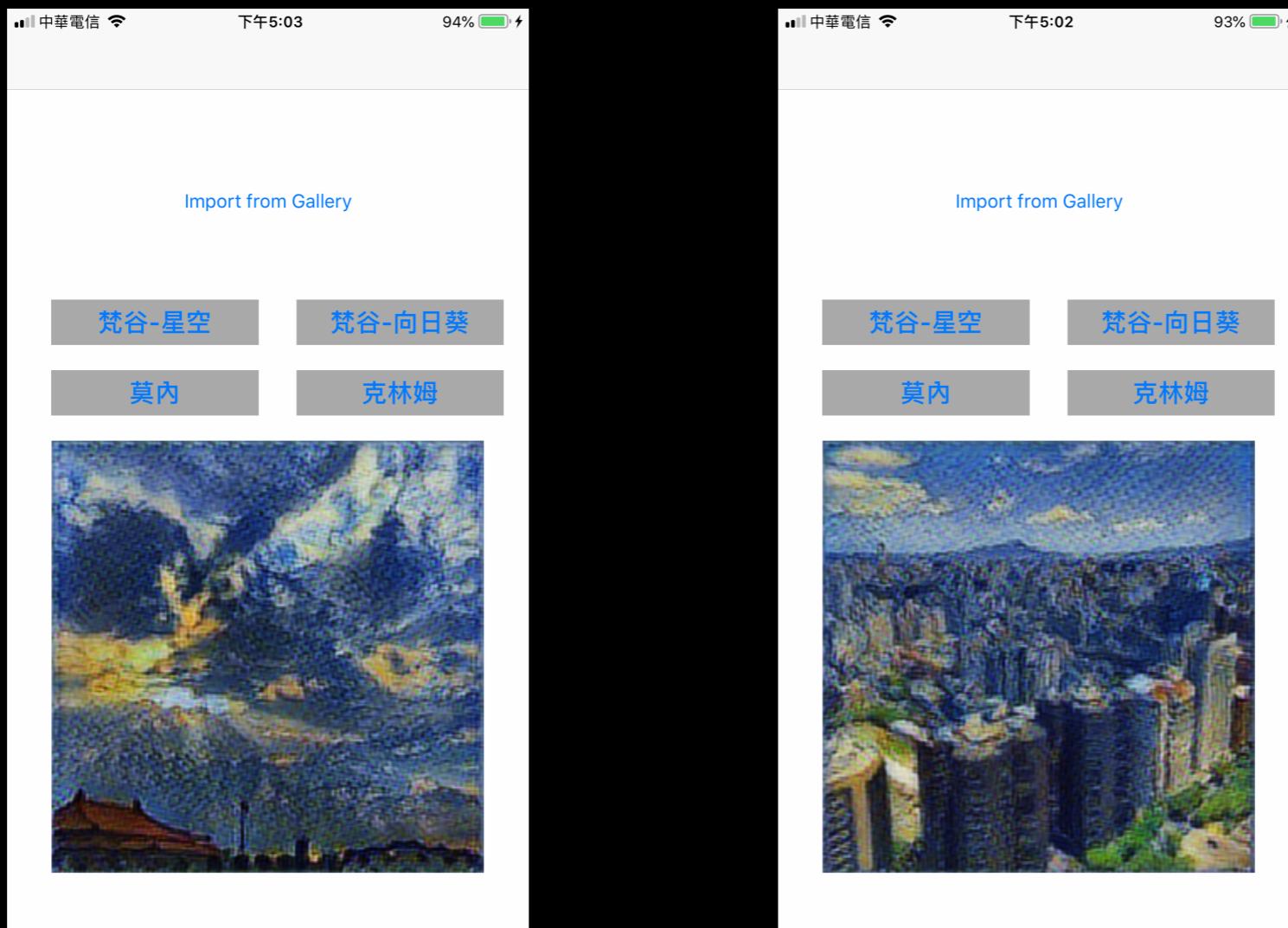
推薦個性化鬍子



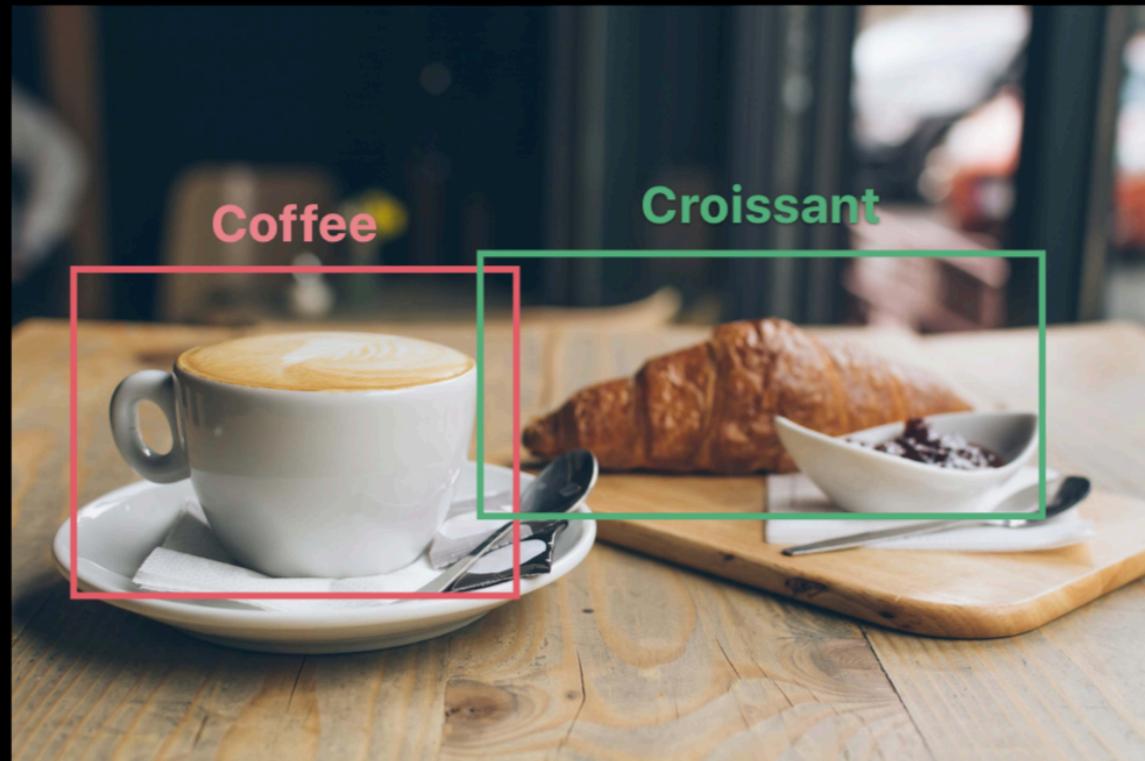
風格變換

Jupyter Notebook

- Image Classifier
- Style Transfer
- Object Detection



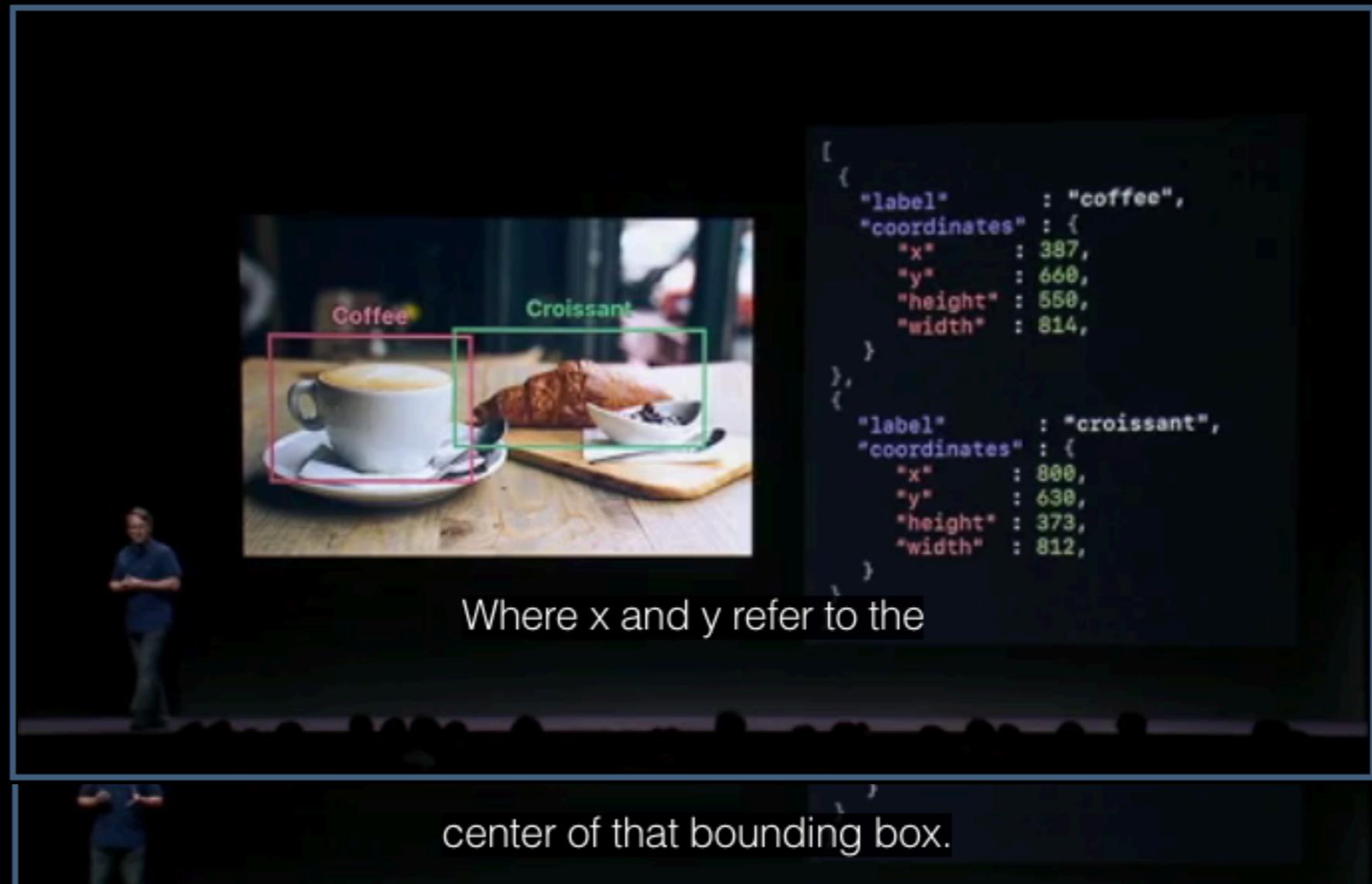
Object Detection



```
[  
  {  
    "label"      : "coffee",  
    "coordinates": {  
      "x"   : 387,  
      "y"   : 660,  
      "height": 550,  
      "width" : 814,  
    }  
  },  
  {  
    "label"      : "croissant",  
    "coordinates": {  
      "x"   : 800,  
      "y"   : 630,  
      "height": 373,  
      "width" : 812,  
    }  
  }  
]
```

**Input need a label key and coordinates key
X, Y refers center of bounding box**

你的 X, Y 是我的 X, Y 嘽?



The slide features a photograph of a coffee cup and a croissant on a wooden table. Two bounding boxes are overlaid: a red one around the coffee cup labeled "Coffee" and a green one around the croissant labeled "Croissant". Below the image, a man stands on a stage. A callout box points from the text "Where x and y refer to the center of that bounding box." to the coordinates listed in the JSON code.

```
[  
  {  
    "label" : "coffee",  
    "coordinates" : {  
      "x" : 387,  
      "y" : 660,  
      "height" : 550,  
      "width" : 814,  
    }  
  },  
  {  
    "label" : "croissant",  
    "coordinates" : {  
      "x" : 800,  
      "y" : 630,  
      "height" : 373,  
      "width" : 812,  
    }  
  }  
,  
]  
Where x and y refer to the  
center of that bounding box.  
center of that bounding box.
```

X and Y refer to the center of bounding box.

X and Y refer to the center of bounding box.

X and Y refer to the center of bounding box.

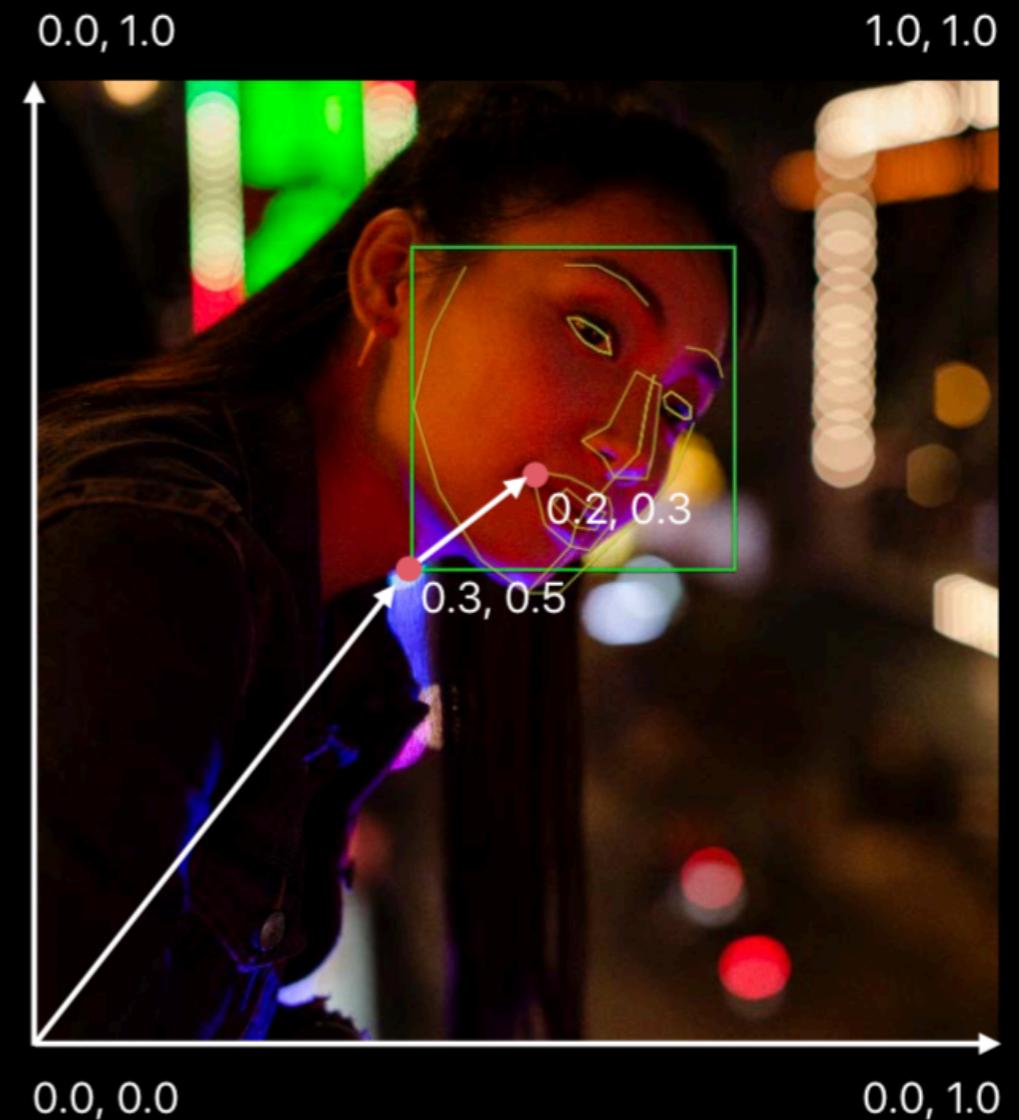
Coordinator of Vision RecognizedObject

Origin point is on the left-down side.

Normalized coordinate.

VNUtils.h has a tool to transfer the coordinate.

Set `imageCropAndScaleOption` to `.scaleFill` has higher prediction result.



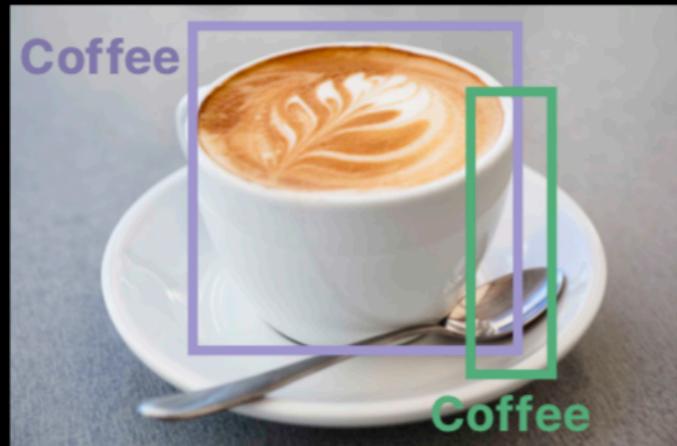
If Tasks is Object Detect

Did you get the label right?

Did you get the bounding box right?



Example of Correct Result



Overlap 10%



Overlap 70%



Overlap 99%



Need **correct labels** AND **at least 50% overlap** in boxes

Update ML Model on Device

You can use URLSessions to update ML model.

```
let compiledUrl = try MLModel.compileModel(at: modelUrl)  
let model = try MLModel(contentsOf: compiledUrl)
```

After compile is done, you can use FileManager to save model on the device.

[**Apple Documentation**](#)



Keywords of ML Community

You can join the keywords on
the left hand side if you want
to go deeper in Core ML

CNN

Tensor Flow

NLP

Model-based

Monte Carlo

Reinforcement Learning

Model Free

Policy

Q learning

Awesome CoreML GitHub Repo

<https://github.com/likedan/Awesome-CoreML-Models>

<https://github.com/SwiftBrain/awesome-CoreML-models>

**These repositories has lots of ML model which already trained.
Such like people's age, location, painting style.**

<https://github.com/MoonAndEye/CoreMLDemo>



Create ML



“Let’s build a ML model today”

<https://github.com/MoonAndEye/CoreMLDemo>