

Machine Learning for iOS

By Cyril

Agenda

- Brief Machine Learning Introduction
- What is Core ML
- Create your own models
- Demo

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Hello ML

- Everywhere
- Gather data and create a model to represent the data
- Challenges
 - Creating, hosting, and updating

Hello ML

- Tools to create
 - PyTorch, TensorFlow, and Keras
- Places to host
 - Google Cloud, AWS, IBM Watson, Microsoft Azure
- Updating on-device is still hard... kinda

What is Core ML

- Core ML Framework for inferences
- A formatted ML model for iOS
- Optimized for on-device inferences
- Easy to use

Neural Networks

Tree Ensembles

Feature Engineering

Support Vector Machines

Pipeline Models

Linear Models

Image/Sound Models

Object Detection

Recommender

Text Classifiers

Style Transfers

Regressions

Image Recognition

```
let model = ImageModel()
```

```
let cgImage = UIImage(named: "myImage")!.cgImage  
let pixelBufferImage = pixelBuffer(forImage: cgImage)
```

```
let prediction = try? model.prediction(image: pixelBufferImage)
```

```
print(prediction?.classLabel)
```

```
print(prediction?.classLabelProbs)
```

Image Recognition with Vision

```
let model = try? VNCoreMLModel(for: ImageModel().model)

let visionRequest = VNCoreMLRequest(model: model) { (request, error)

    let results = request.results as? [VNClassificationObservation]

    let identifier = results?.first?.identifier
    let confidenceLevel = results?.first?.confidence.binaude

    print(identifier, confidenceLevel)

}

let cgImage = UIImage(named: "myImage")!.cgImage

try? VNImageRequestHandler(cgImage: image, options: [:]).perform([visionRequest])
```

Text Classification

```
let model = SentimentPolarity()  
  
let textInput = bow(text: "Today is a great day!")  
  
let results = try? model.prediction(input: textInput)  
  
print(results?.classLabel)  
print(results?.classProbability)
```

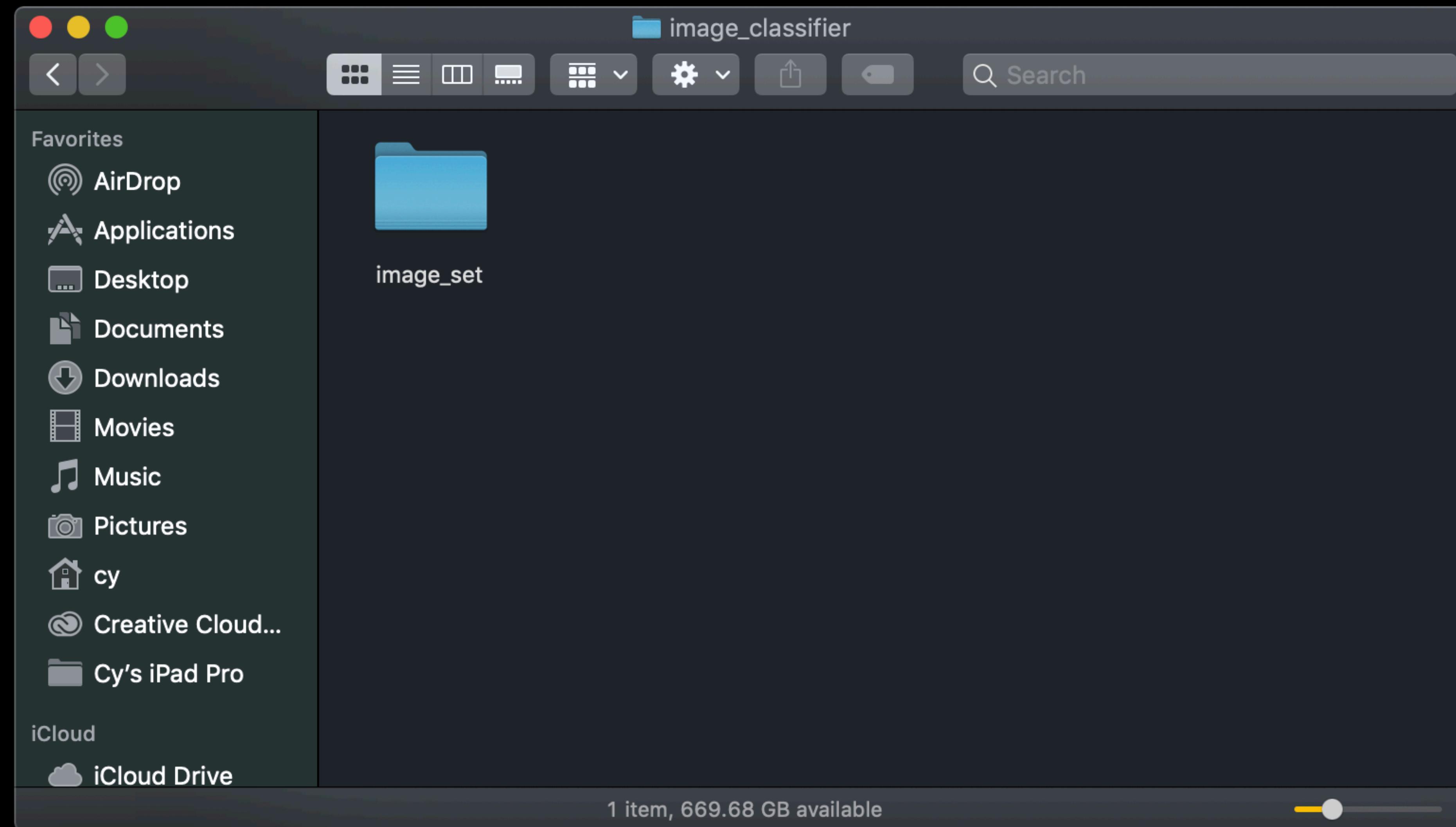
Create your own ML Models

- Turi Create or Create ML
- Keras, PyTorch, or TensorFlow
- CoreMLTools to format your model

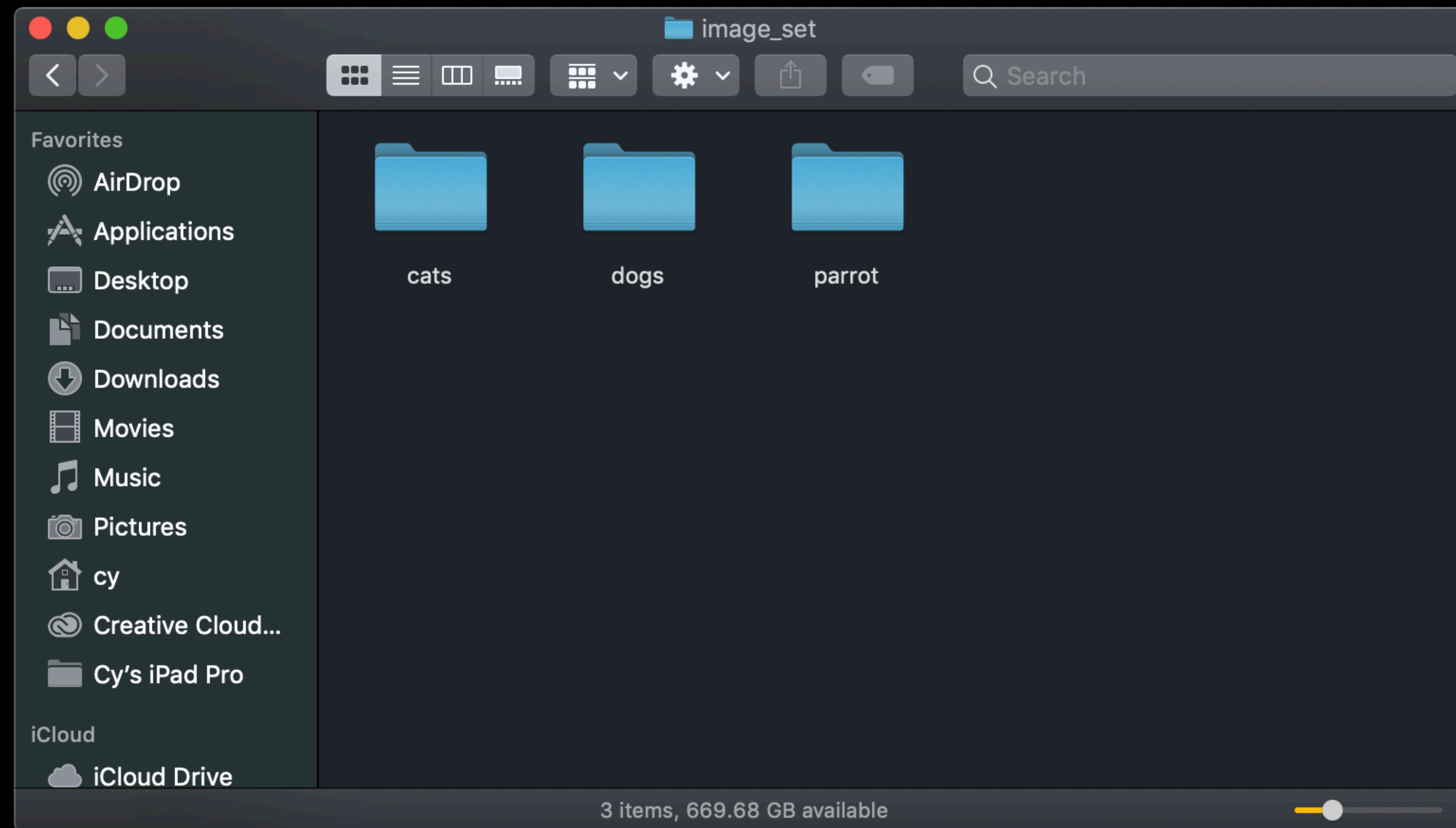
Turi Create

- Simplifies the development of ML Model
- Focuses on task instead of algorithms
- Built-in streaming visualizations to explore your dataset
- Supports text, images, audio, video, and sensor data

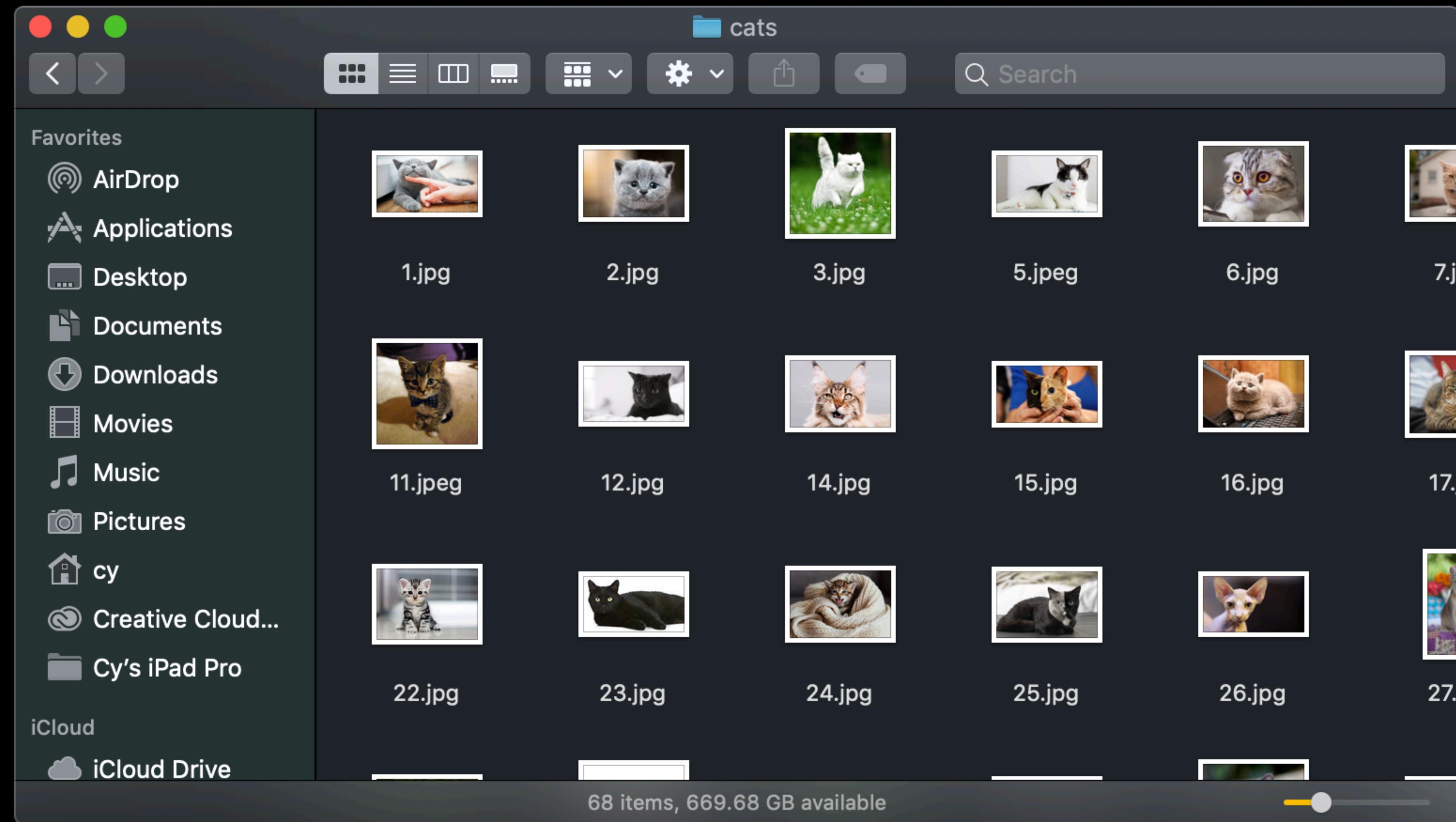
Create Image Classifiers



Create Image Classifiers



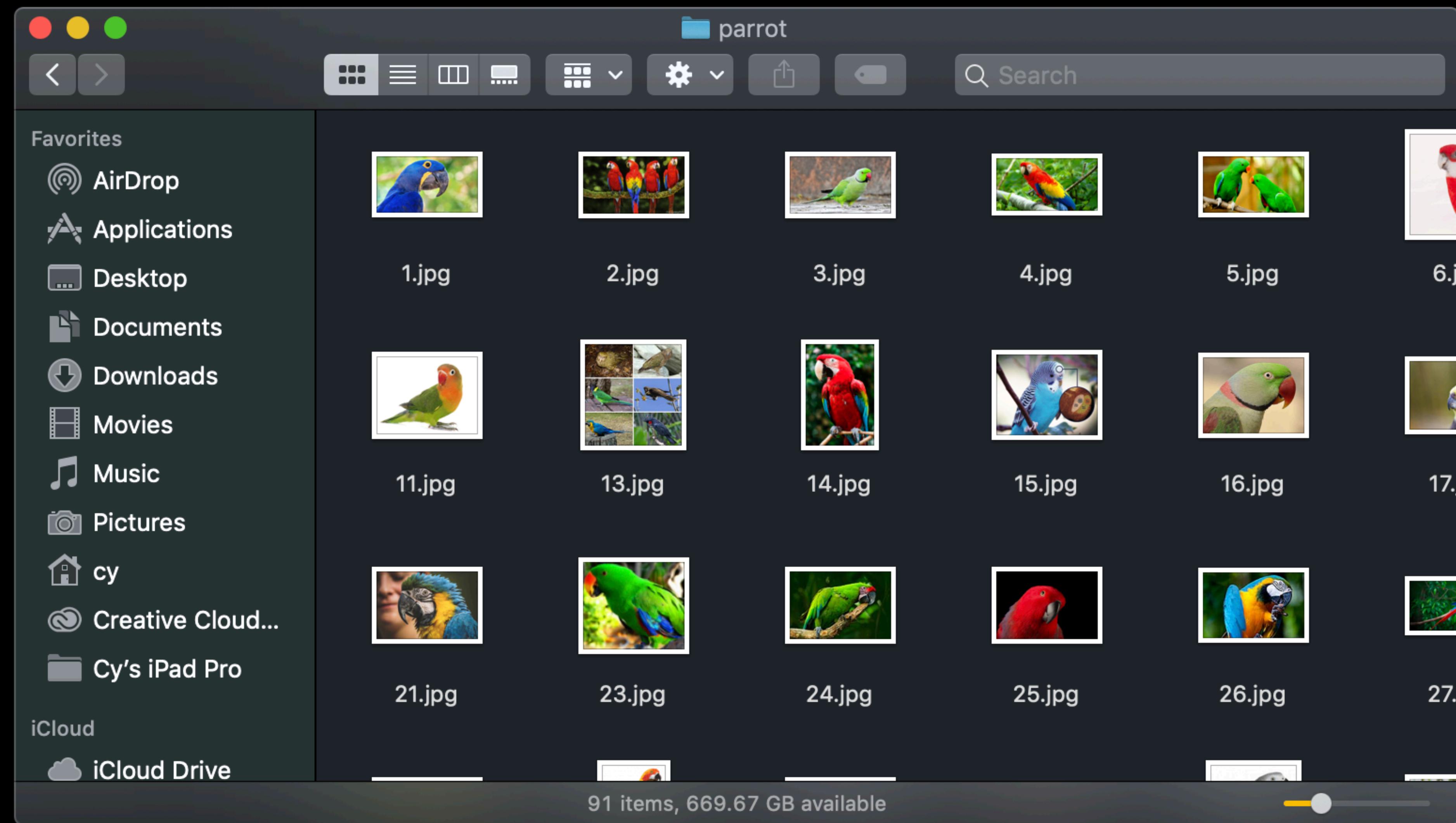
Create Image Classifiers



Create Image Classifiers



Create Image Classifiers



Create Image Classifiers

```
import turicreate as tc

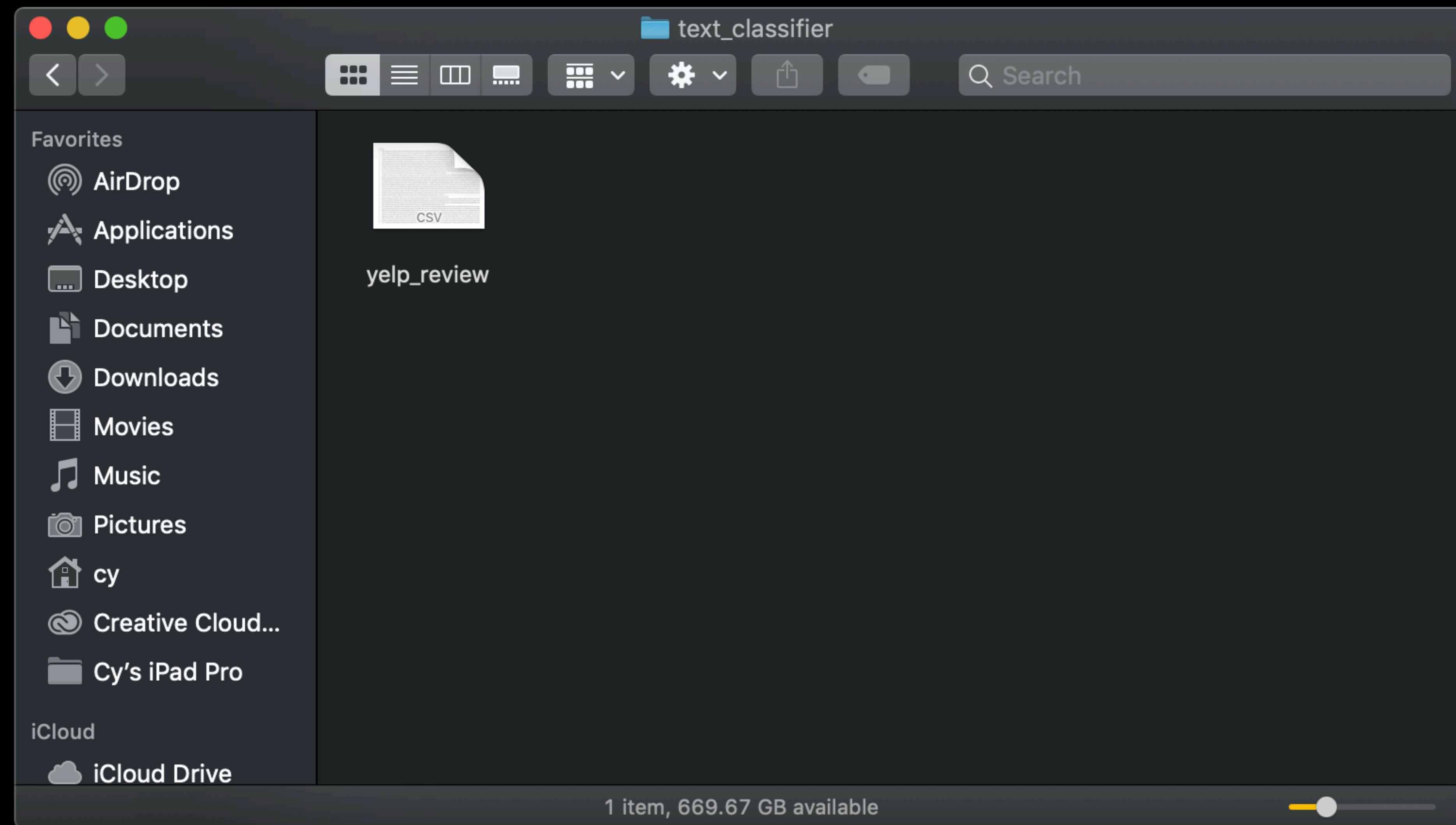
data = tc.image_analysis.load_images('image_set', with_path=True)

data['label'] = data['path'].apply(lambda path: path.split('/')[-2])

model = tc.image_classifier.create(data, target='label')

model.export_coreml('Pets.mlmodel')
```

Create Text Classifiers



Create Text Classifiers

yelp_review	
stars	text
5	<p>Super simple place but amazing nonetheless. It's been around since the 30's and they still serve the same thing they started with: a bolognese pasta dish.</p> <p>Staff was very helpful and friendly.</p>
5	<p>Small unassuming place that changes their menu every so often. Cool decor and vibe inside their 30 seat restaurant. Call for a reservation if you want to sit inside.</p> <p>We had their beef tartar and pork belly to start and a salmon dish and lamb meal for mains. Everything was incredible! I could go on at length about how good it was.</p> <p>A bit outside of downtown montreal but take the metro out and it's less than a 10 minute walk from the station.</p>
5	<p>Lester's is located in a beautiful neighborhood and has been there since 1951. They are known for smoked meat which most deli's have lost the art of.</p> <p>The smoked meat is up there in quality and taste with Schwartz's and you'll find less tourists at Lester's as well.</p>
4	<p>Love coming here. Yes the place always needs the floor swept but when you give out peanuts in the shell how won't it always be a bit dirty?</p> <p>The food speaks for itself, so good. Burgers are made to order and the meat is put on the grill when you order your sandwich. Getting the fries adds a bit of spice to them and whatever size you order they always throw more fries (a lot more fries) into the bag.</p>
4	<p>Had their chocolate almond croissant and it was amazing! So light and buttery and oh my how chocolaty.</p> <p>If you're looking for a light breakfast then head out here. Perfect spot for a coffee\latté before heading out to the old port.</p>
5	<p>Cycle Pub Las Vegas was a blast! Got a groupon and rented the bike for 11 of us for an afternoon tour. Each bar was more fun than the last.</p>
4	<p>Who would have guess that you would be able to get fairly decent Vietnamese restaurant in East York?</p> <p>Not quite the same as Chinatown in terms of pricing (slightly higher) but definitely one of the better Vietnamese restaurants outside of the city.</p> <p>So far the only items I have tried are the phos (beef, chicken & vegetarian) - and they have not disappointed me! Especially the chicken pho.</p> <p>Next time I go back, I'm going to try the banh cuon (steamed rice noodle) and the vermicelli!</p>

Create Text Classifiers

```
import turicreate as tc  
  
data = tc.SFrame('yelp_review.csv')  
  
model = tc.text_classifier.create(data, 'stars' features=['text'])  
  
model.export_coreml('Reviews.mlmodel')
```

Useful Turi Create Functions

```
sframe_data.save('model_name.sframe') # For later use  
  
sframe_data = tc.load('model_name.sframe')  
  
training_data, testing_data = sframe_data.random_split(0.8)  
# 80% of your data will be used as training data,  
# 20% will be used as testing data  
  
model.predict(testing_data) # make a prediction  
  
model.evaluate(testing_data) # evaluate and analyze your model
```

Demo

GitHub Repo

