Food Image Recognition

Team11

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Pipeline

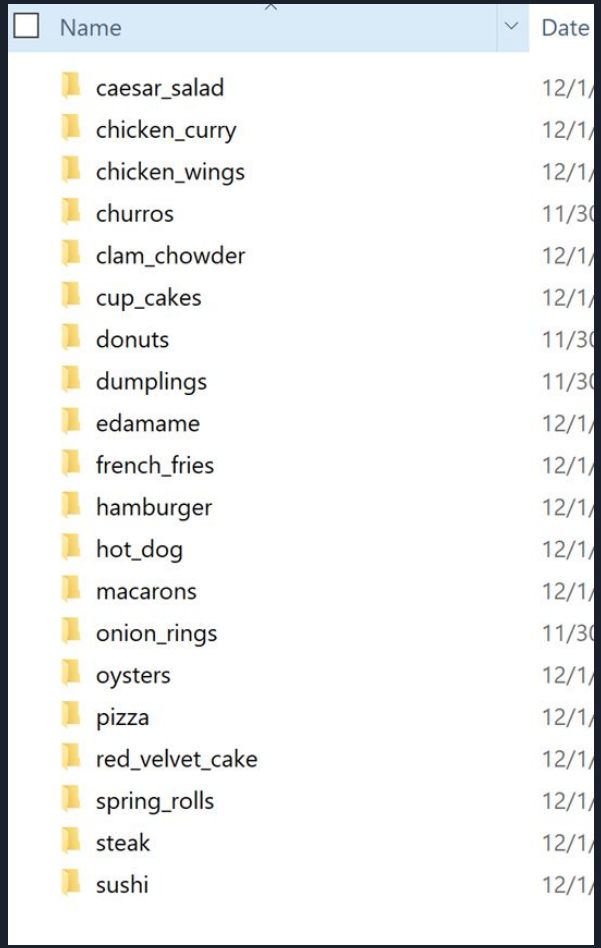
Food image recognition:

- Image Filtering and Processing
- TensorFlow Inception V3 Retrain Model for image recognition
- Play Front-End for single food image recognition
- Create and test on Large Dataset and user image data frequency analysis- Spark MapReduce

Data Sources

ETH Food-101: https://www.vision.ee.ethz.ch/datasets_extra/food-101

- 20 categories with 20,000 images, with a size of ~ 1GB.
- Training Dataset - 75% 1,5000 images
- Test Dataset - 25% 5,000 images



Use Cases

Use Case 1 : Customers

- Customers take pictures of their food, upload the food image to this image classifier, and it will tell them what categories their foods belong to.

Use Case 2 : Restaurants

- Chefs/owners collect categories and images stored in this image classifier, to see the reports of the most frequently liked/visited categories of foods.

Use Case 3 : Businesses

- Businesses/commercials upload a large number of food images to be classified into categories automatically by this image classifier, and save the categories for further use.

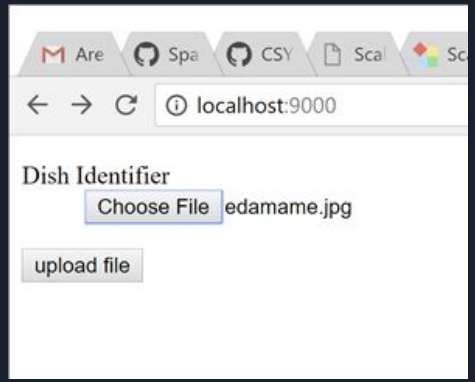
Use Case 1: Console

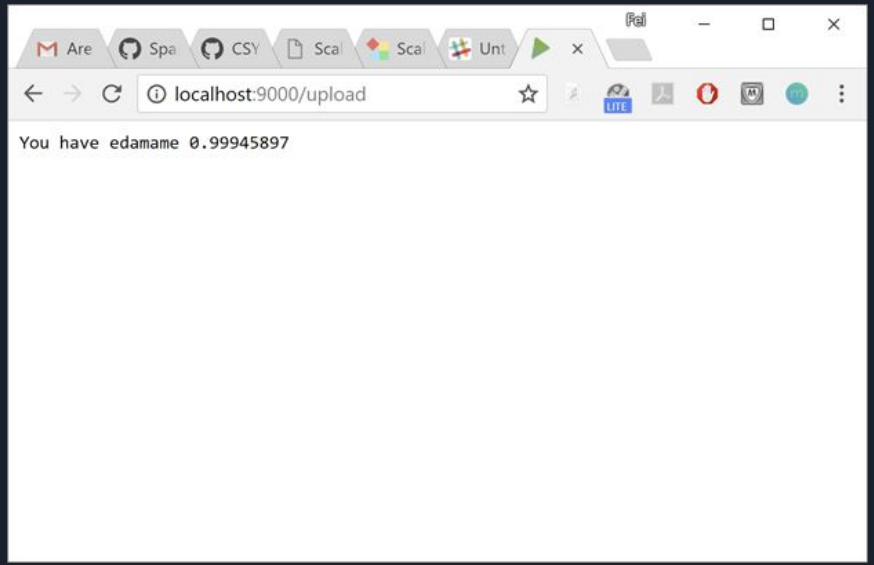
Input: jpg image of food

Outputs: 5 label

```
INFO: successfully loaded C:\Users\Fei\AppData
Label(sushi,0.98963135)
Label(oysters,0.0074463724)
Label(edamame,0.0014635394)
Label(chicken wings,4.0837927E-4)
Label(steak,2.4154862E-4)
2017-12-03 18:42:24.431926: W C:\tmp\_bazel_sy
```

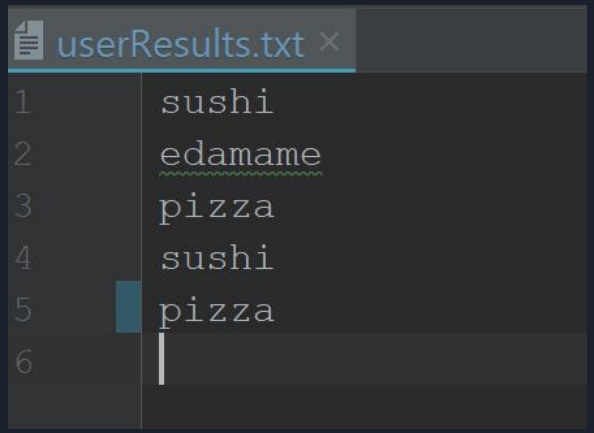
Use Case 1: Play (Demo)





Use Case 2:

Spark MapReduce: user using play, and image recognition results are stored in userResults.txt file. Later Spark MapReduce will process it to find the most popular dishes tested.

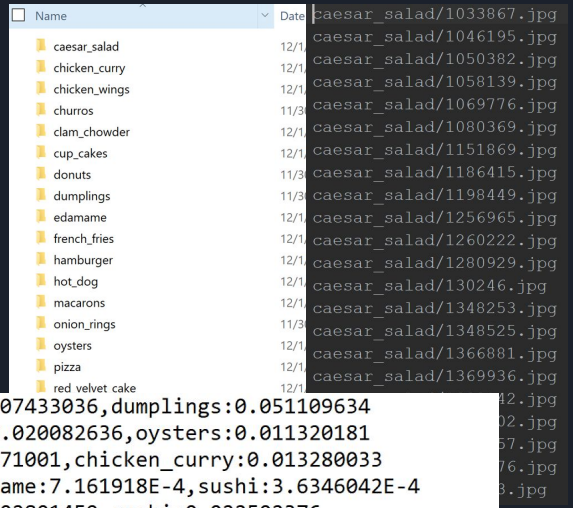



```
(sushi,2)
(pizza,1)
(edamame,1)
```

Use Case3: Bulk Image

Inputs: Food image directory and image folder list:

Outputs: top 5 guesses with probabilities




```
caesar_salad,caesar_salad:0.48732376,spring_rolls:0.20447089,chicken_curry:0.1[illegible]51874,steak:0.07433036,dumplings:0.051109634
caesar_salad,caesar_salad:0.8539048,chicken_curry:0.04773367,chicken_wings:0.020913368,sushi:0.020082636,oysters:0.011320181
caesar_salad,caesar_salad:0.8498962,spring_rolls:0.030908393,hamburger:0.029272884,steak:0.02571001,chicken_curry:0.013280033
caesar_salad,caesar_salad:0.99513215,spring_rolls:0.0013952814,chicken_curry:0.0013681612,edamame:7.161918E-4,sushi:3.6346042E-4
caesar_salad,caesar_salad:0.7662041,spring_rolls:0.10255305,steak:0.040466942,chicken_wings:0.02801459,sushi:0.022502376
caesar_salad,caesar_salad:0.8850728,chicken_curry:0.07765863,chicken_wings:0.007047195,dumplings:0.0057271086,steak:0.00526902
caesar_salad,caesar_salad:0.6820307,chicken_curry:0.11280671,chicken_wings:0.0914395,steak:0.06831194,sushi:0.015619475
caesar_salad,caesar_salad:0.45541134,sushi:0.23809974,spring_rolls:0.10787754,hamburger:0.03819183,clam_chowder:0.034302976
caesar_salad,caesar_salad:0.7982124,pizza:0.07526094,chicken_curry:0.04371177,sushi:0.021302685,spring_rolls:0.019245956
caesar_salad,chicken_wings:0.43096563,sushi:0.17791432,caesar_salad:0.1341052,chicken_curry:0.057530757,spring_rolls:0.03616446
caesar_salad,caesar_salad:0.50923026,sushi:0.19442198,chicken_curry:0.06531843,spring_rolls:0.05775964,edamame:0.04281239
caesar_salad,caesar_salad:0.9359093,sushi:0.019795893,chicken_curry:0.018751677,spring_rolls:0.0065901047,hot_dog:0.0051826886
caesar_salad,caesar_salad:0.7725243,spring_rolls:0.074007824,steak:0.025395561,hamburger:0.025341185,chicken_wings:0.018662734
caesar_salad,caesar_salad:0.88808465,spring_rolls:0.032968413,chicken_curry:0.016807783,dumplings:0.0108963465,hot_dog:0.0102682
caesar_salad,spring_rolls:0.50253034,caesar_salad:0.3487904,dumplings:0.04769256,sushi:0.024204768,chicken_curry:0.02243539
caesar_salad,caesar_salad:0.99731594,spring_rolls:9.1491925E-4,chicken_curry:3.626027E-4,hamburger:2.6587886E-4,edamame:2.3244083E-4
```

```
(caesar_salad,0.928,0.8557825186206894,0.996)
```

Acceptance Criteria

Test dataset: 20 categories with 250 images each. 5000 images in total

- Food image recognition >=60%; recall >=50%
- The top probability for food classification: precision >= 60%, recall >=40%
- The probability of getting correct food categories within 5 guesses: precision: >=70%, recall: >=50%

- The correct Label in Top1 guess (correctly recognize): precision: 90.92%, recall 82.66%
- The top probabilities - precision: 87.05%, recall: 79.14%
- The correct Label within top5 guess: 99.24%, 90.23%

Cont.

The results based on different categories: (label, top guess correctly, average probability, correct guess in top5 guesses).

```
17/12/13 12:38:56 INFO Executor: Running task 0.0 in st
17/12/13 12:38:56 INFO ShuffleBlockFetcherIterator: Get
17/12/13 12:38:56 INFO ShuffleBlockFetcherIterator: Sta
(oysters,0.92,0.8992679979565217,0.984)
(hot_dog,0.908,0.9324994168722467,0.988)
(caesar_salad,0.928,0.8557825186206894,0.996)
(donuts,0.864,0.8634563678240744,0.996)
(french_fries,0.932,0.8909919936051501,0.988)
(macarons,0.964,0.8709036554771785,1.0)
(clam_chowder,0.944,0.9191916919915246,0.996)
(sushi,0.864,0.792203189444444,0.996)
(steak,0.9,0.8202636305333327,0.996)
(pizza,0.984,0.956709301504065,0.992)
(churros,0.816,0.8343275746568624,0.992)
(cup_cakes,0.908,0.8573479737004407,0.992)
(onion_rings,0.908,0.845624879515419,0.992)
(spring_rolls,0.852,0.8002992836150234,0.98)
(chicken_wings,0.904,0.8179691852212394,1.0)
(red_velvet_cake,0.908,0.8916681976651976,0.992)
(chicken_curry,0.876,0.7728758836986299,0.988)
(edamame,0.996,0.9627667917670678,1.0)
(hamburger,0.892,0.8926127556053806,0.992)
(dumplings,0.916,0.9322992708296939,0.988)
17/12/13 12:38:56 INFO Executor: Finished task 0.0 in s
17/12/13 12:38:56 INFO TaskSetManager: Finished task 0.
17/12/13 12:38:56 INFO TaskSchedulerImpl: Removed TaskS
```

Unit Test Results:

PASS

Total:

Core: Tensorflow, Spark, Generate test results

Play:

Coverage HomeControllerSpec

60% classes, 53% lines covered in 'all classes in scope'

tensorflow	80% (33/41)	68% (59/86)	70% (114/162)
test			
webapps			

router	46% (7/15)	46% (18/39)	46% (39/84)
scala			

controllers	55% (11/20)	32% (18/56)	50% (44/88)
darwin			

Q&A

THANK YOU!