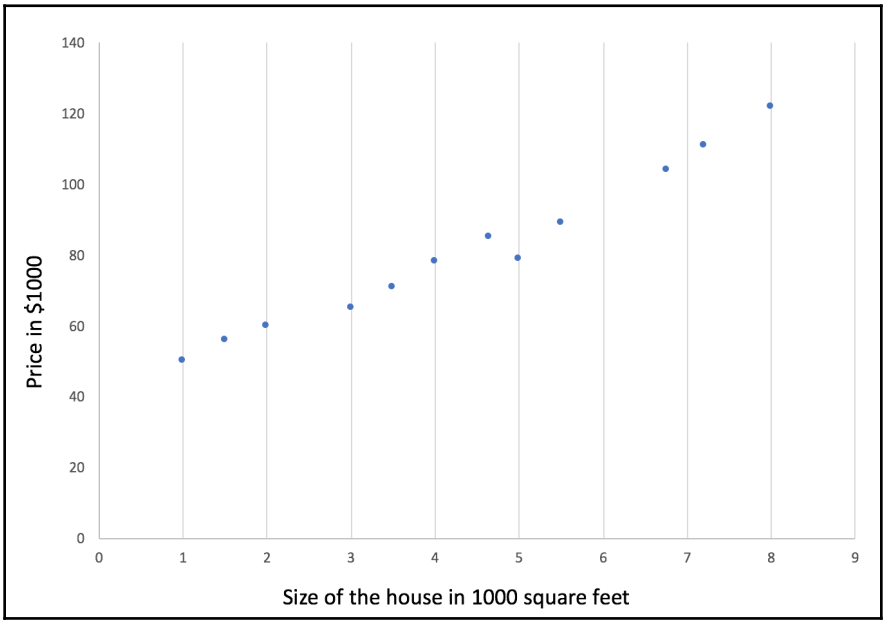
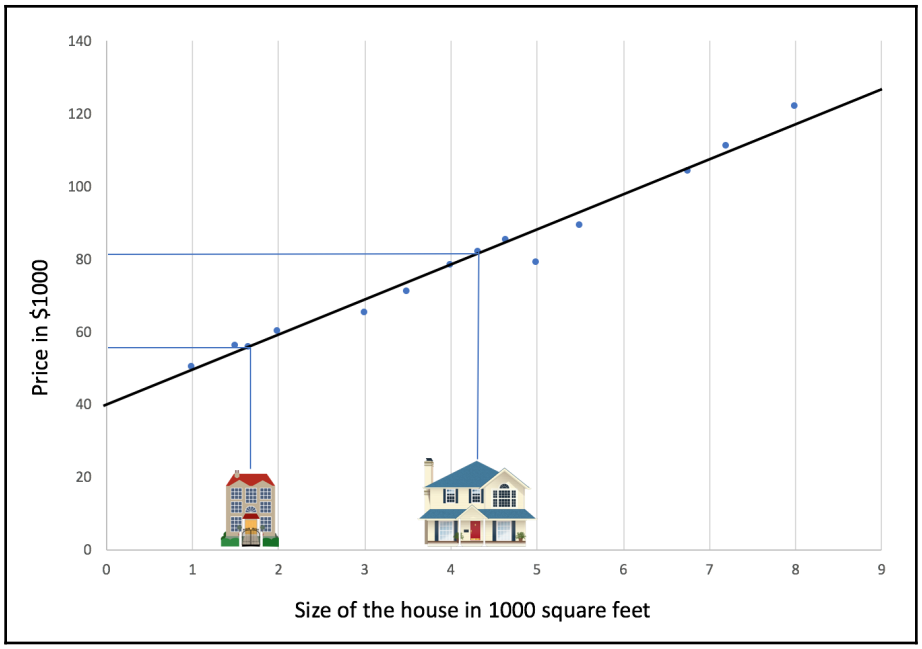
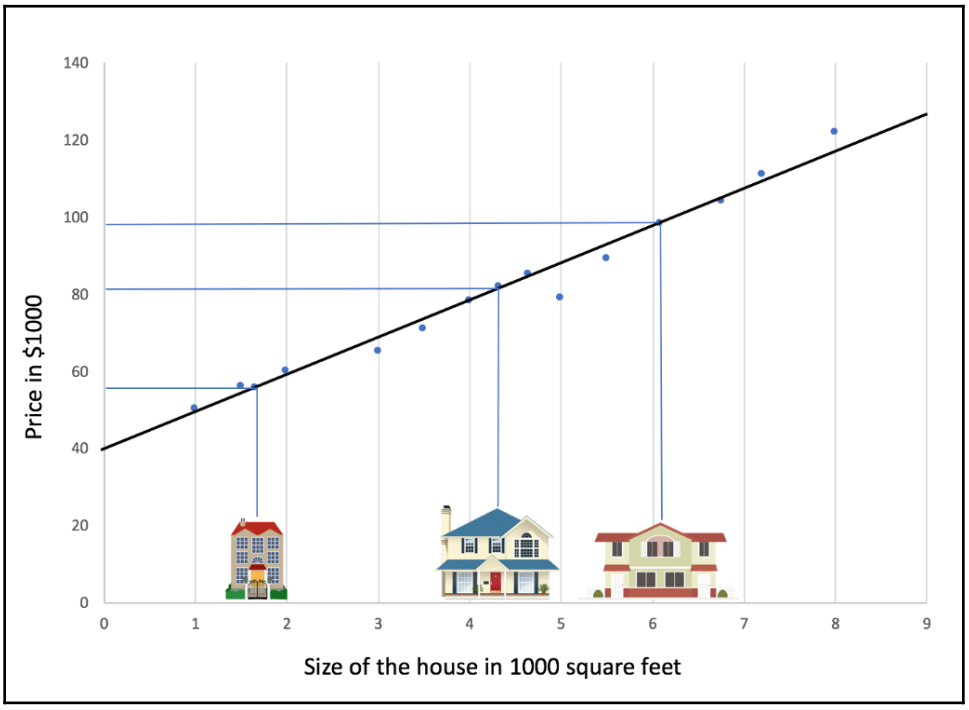
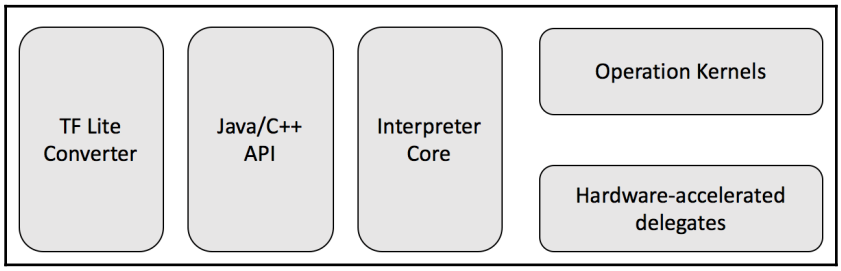
Chapter 1: Mobile Landscapes in Machine Learning

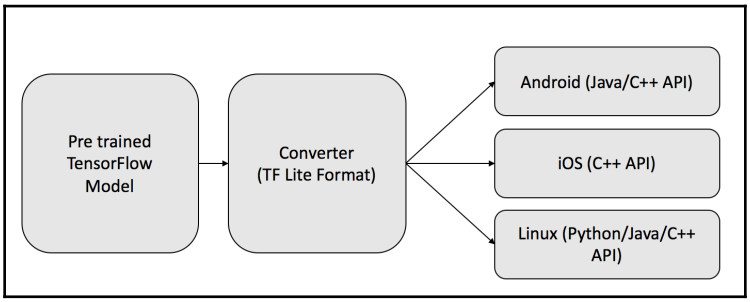


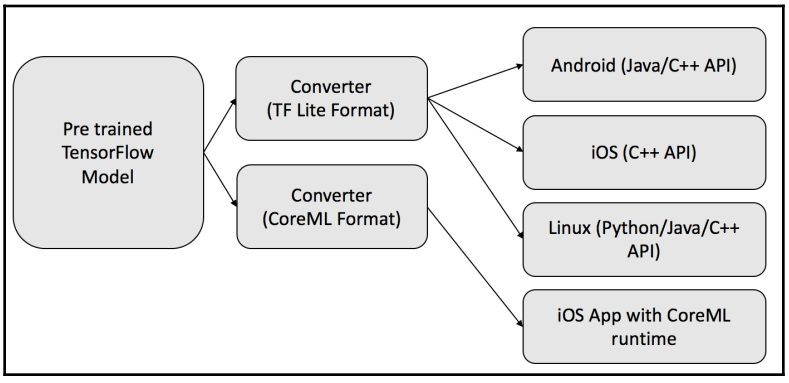

140
120
100
80
60
40
20
0
Price in $1000
0
1
2
3
4
5
6
7
8
9
Size of the house in 1000 square feet

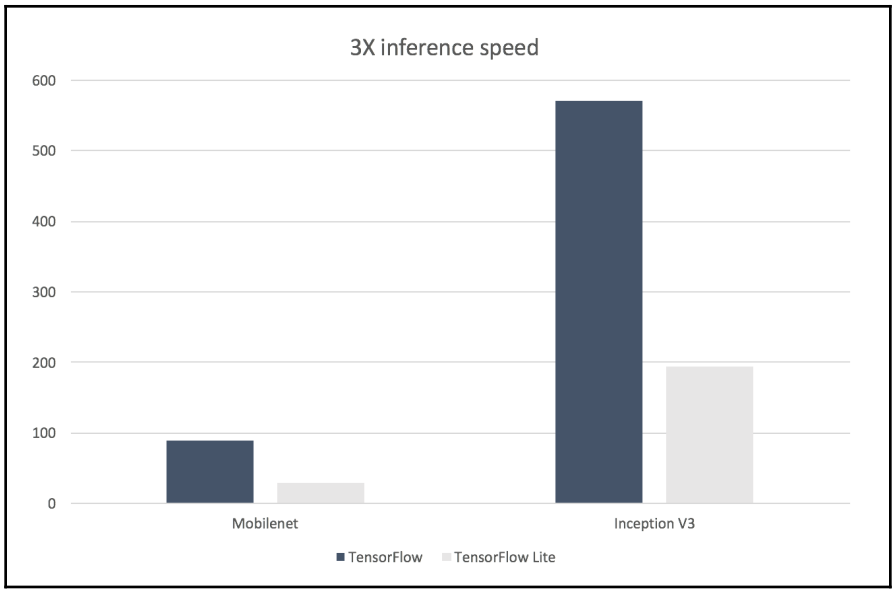

140
120
100
80
60
40
20
0
Price in $1000
0
1
2
3
4
5
6
7
8
9
Size of the house in 1000 square feet

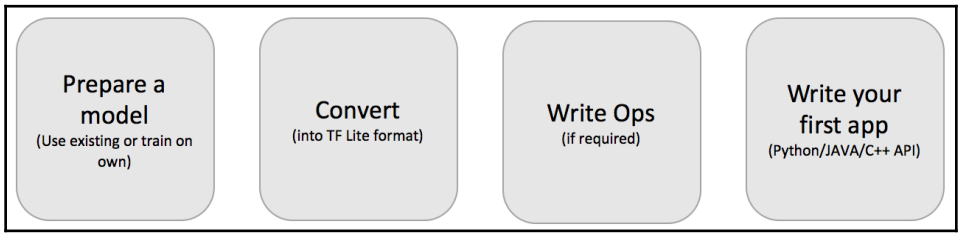

$82000
$55500
$98300

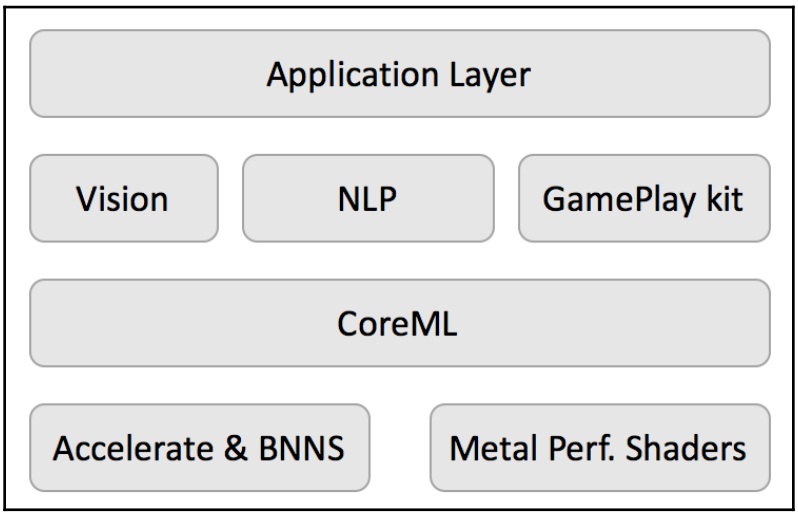

TF Lite Converter
Java/C++ API
Interpreter Core
Operation Kernels
Hardware-accelerated delegates


Pre trained TensorFlow Model
Converter (TF Lite Format)
Android (Java/C++ API)
iOS (C++ API)
Linux (Python/Java/C++ API)


Pre trained TensorFlow Model
Converter (TF Lite Format)
Converter (CoreML Format)
Android (Java/C++ API)
iOS (C++ API)
Linux (Python/Java/C++ API)
iOS App with CoreML runtime

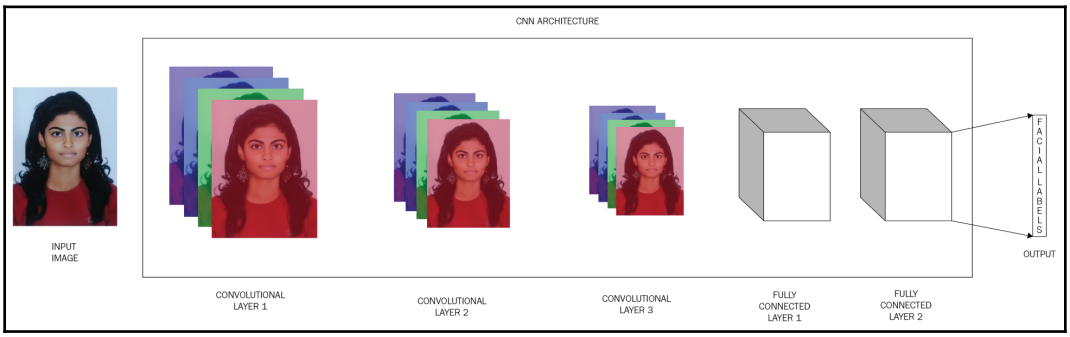

3X inference speed
600
500
400
300
200
100
0
Mobilenet
Inception V3
TensorFlow
TensorFlow Lite

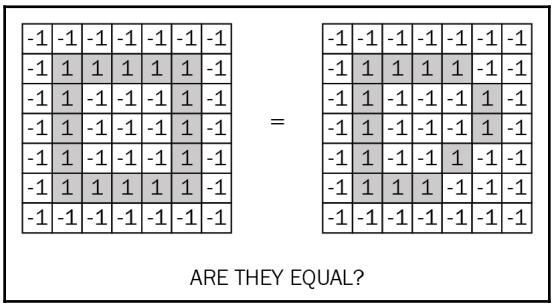

Prepare a model
(Use existing or train on own)
Convert
(into TF Lite format)
Write Ops
(if required)
Write your first app
(Python/JAVA/C++ API)

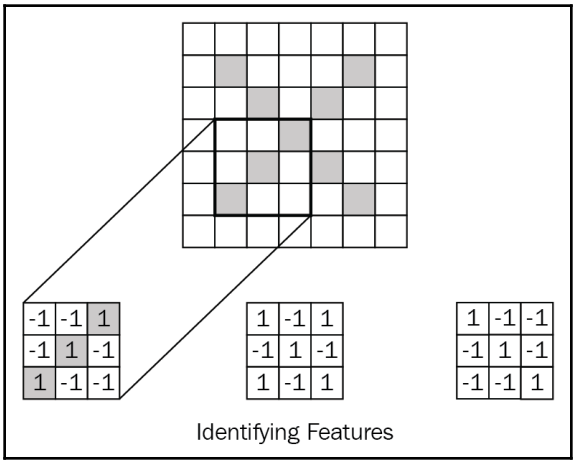

Application Layer
Vision
NLP
GamePlay kit
CoreML
Accelerate & BNNS
Metal Perf. Shaders

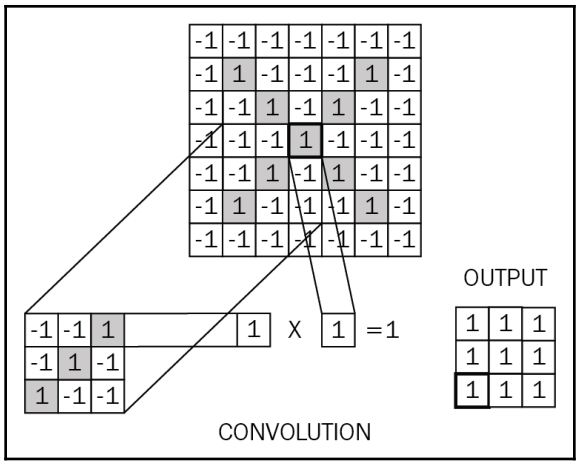

Faces
Faces
Resources
MobileNet.mlmodel
Machine Learning Model
Name MobileNet
Type Neural Network Classifier
Size 17.1 MB
Author Andrew G. Howard, Menglong Zhu, Bo Chen, Dmitry Kalenichenko, Weijun Wang, Tobias Weyand, Marco Andreetto, Hartwig Adam
Description MobileNets are based on a streamlined architecture that have depth-wise separable convolutions to build light weight deep neural networks. Trained on ImageNet with categories such as trees, animals, food, vehicles, person etc. MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications https://github.com/shicai/MobileNet-Caffe
License Apache License. Version 2.0 http://www.apache.org/licenses/LICENSE-2.0
Model Class
MobileNet
Automatically generated Swift model class
Model Evaluation Parameters
Name
Type
Description
Inputs
image
Image (Color 224 x 224)
Input image to be classified
Outputs
classLabelProbs
Dictionary (String → Double)
Probability of each category
classLabel
String
Most likely image category

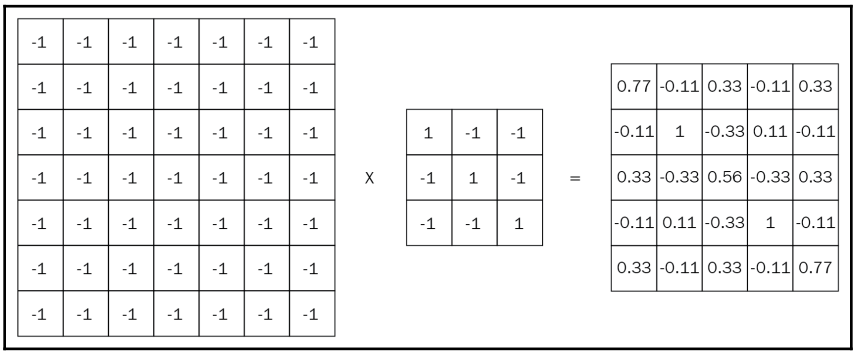
Chapter 2: CNN Based Age and Gender Identification Using Core ML

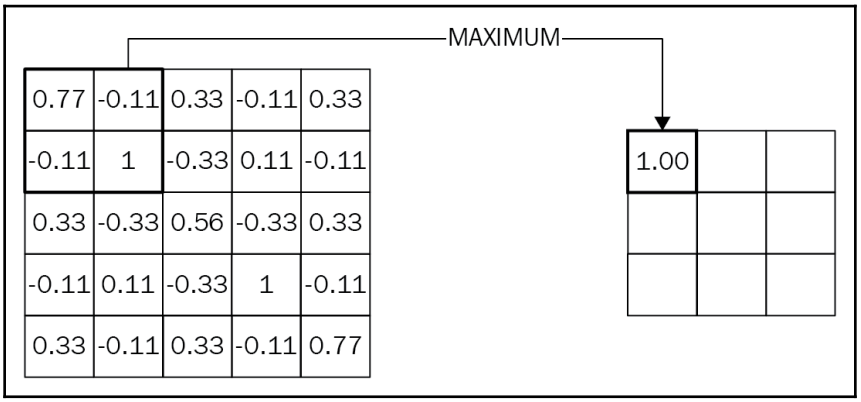


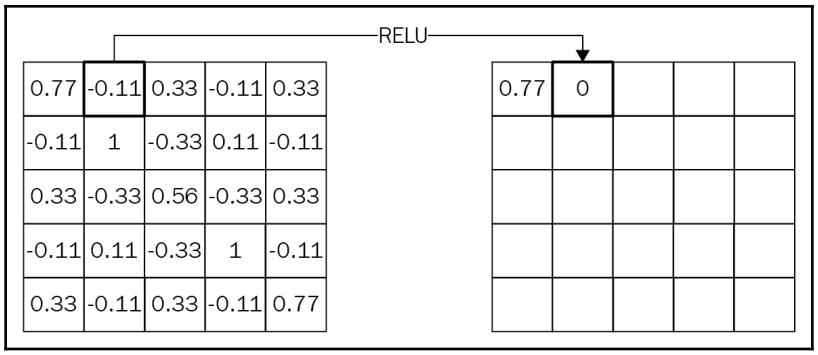


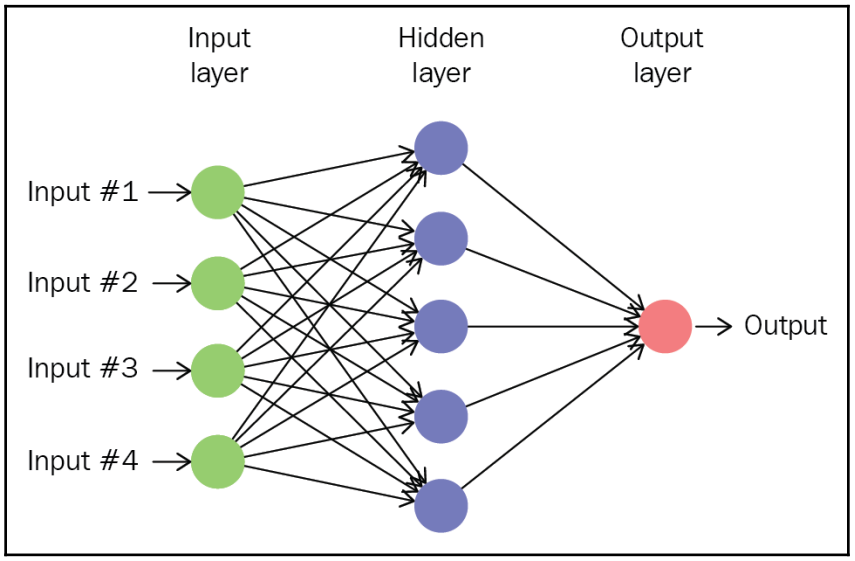


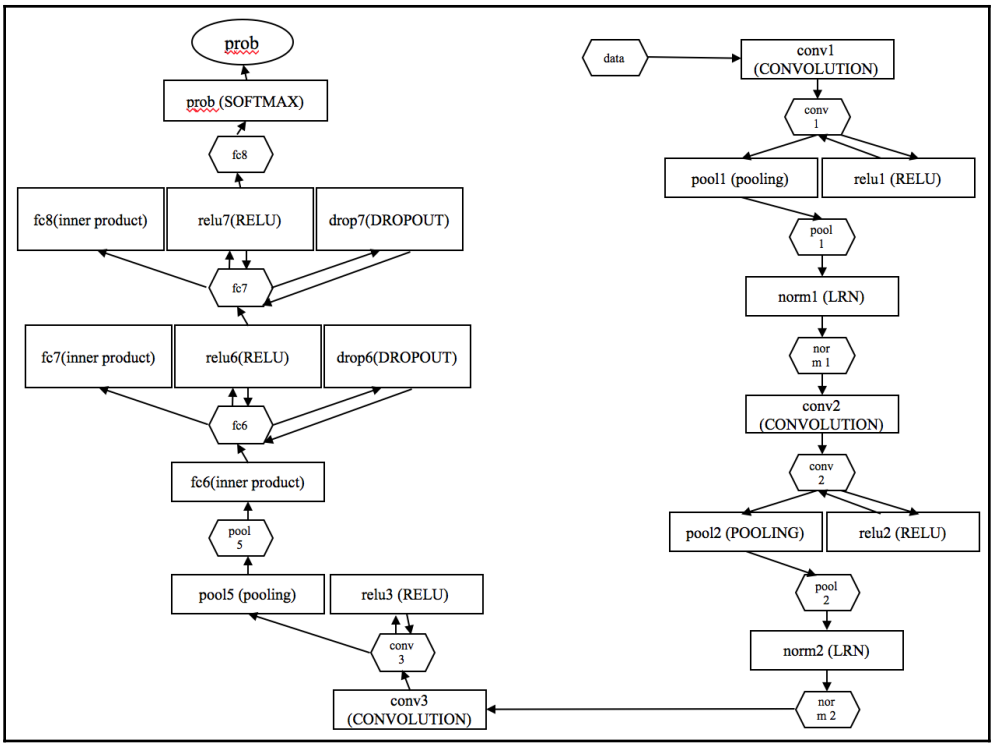

OUTPUT
X
=1
CONVOLUTION

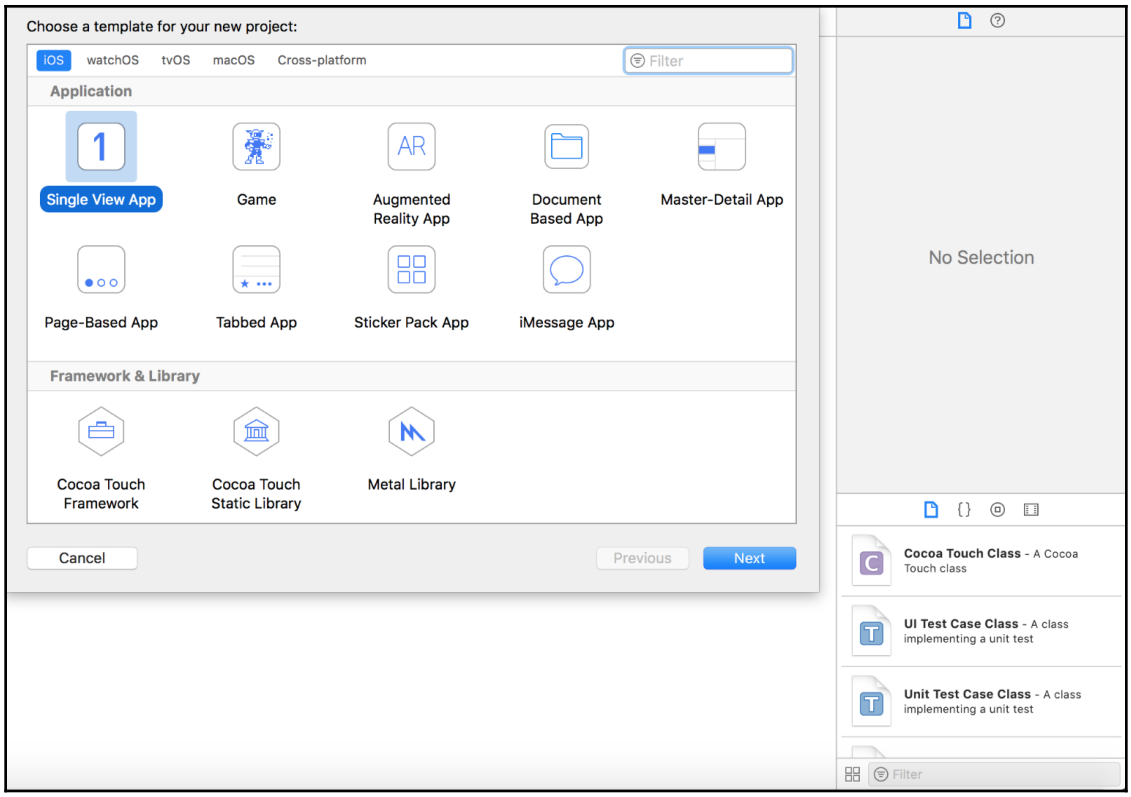


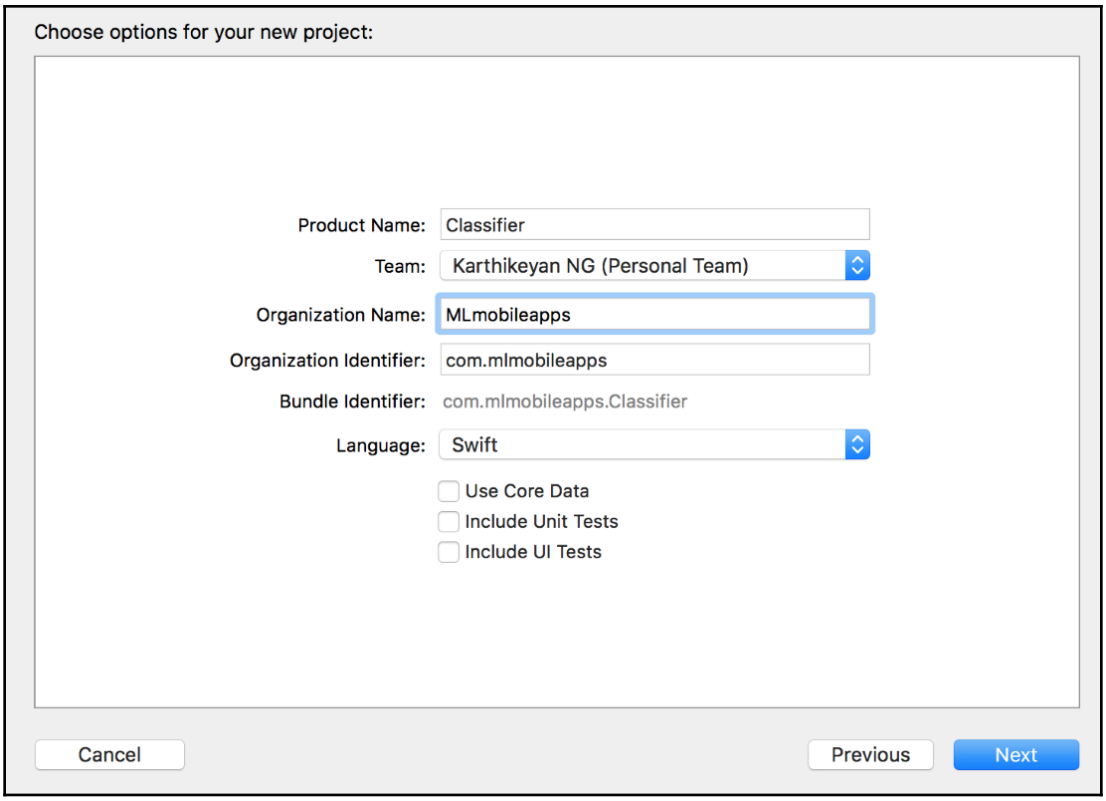

MAXIMUM

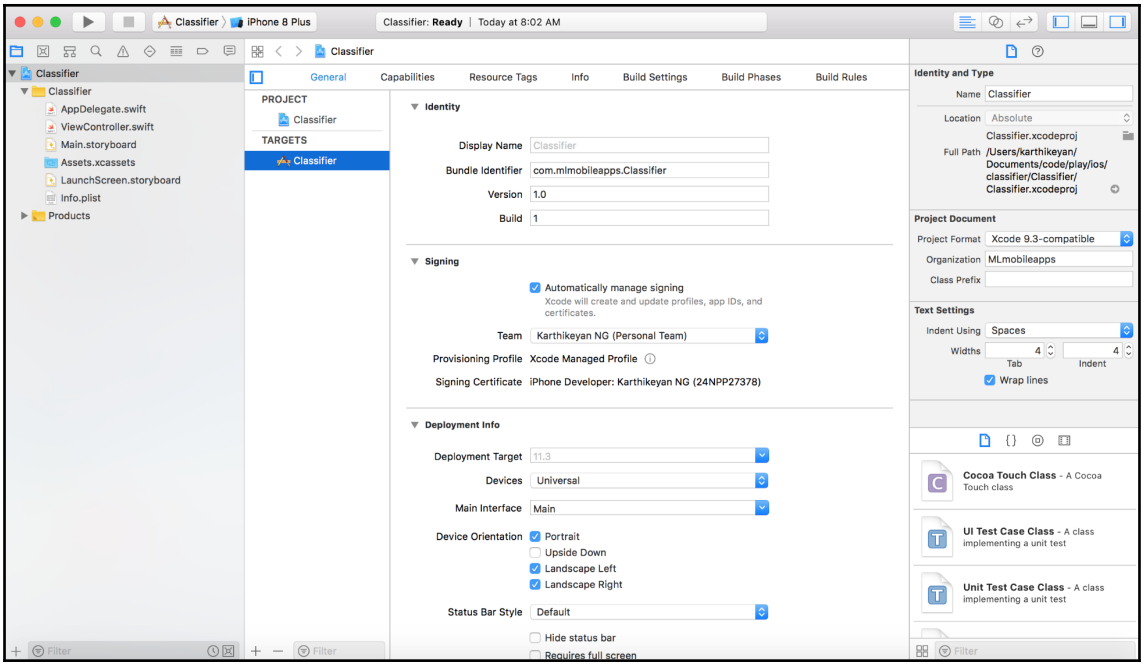

RELU
0.77 -0.11 0.33 -0.11 0.33
-0.11 1 -0.33 0.11 -0.11
0.33 -0.33 0.56 -0.33 0.33
-0.11 0.11 -0.33 1 -0.11
0.33 -0.11 0.33 -0.11 0.77
0.77 0

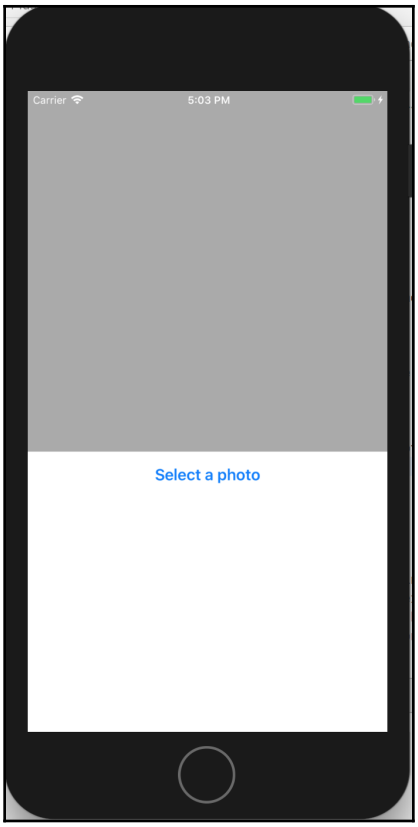

Input layer
Hidden layer
Output layer
Input #1
Input #2
Input #3
Input #4
Output

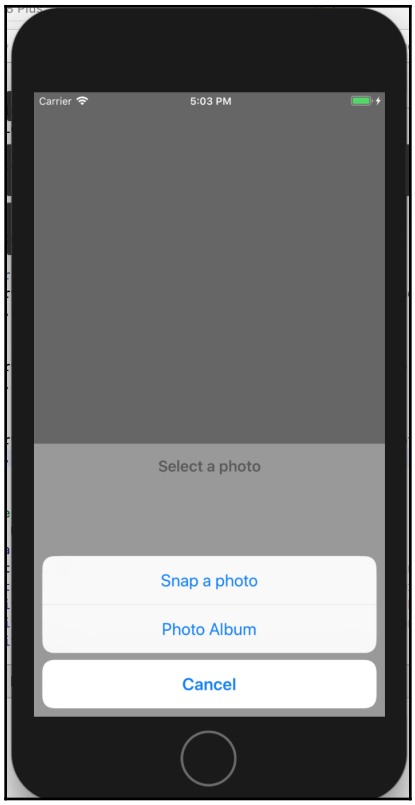

prob
prob (SOFTMAX)
fc8
fc8(inner product)
relu7(RELU)
drop7(DROPOUT)
fc7
fc7(inner product)
relu6(RELU)
drop6(DROPOUT)
fc6
fc6(inner product)
pool 5
pool5 (pooling)
relu3 (RELU)
conv 3
conv3 (CONVOLUTION)
data
conv1 (CONVOLUTION)
conv 1
pool1 (pooling)
relu1 (RELU)
pool 1
norm1 (LRN)
nor m 1
conv2 (CONVOLUTION)
conv 2
pool2 (POOLING)
relu2 (RELU)
pool 2
norm2 (LRN)
nor m 2

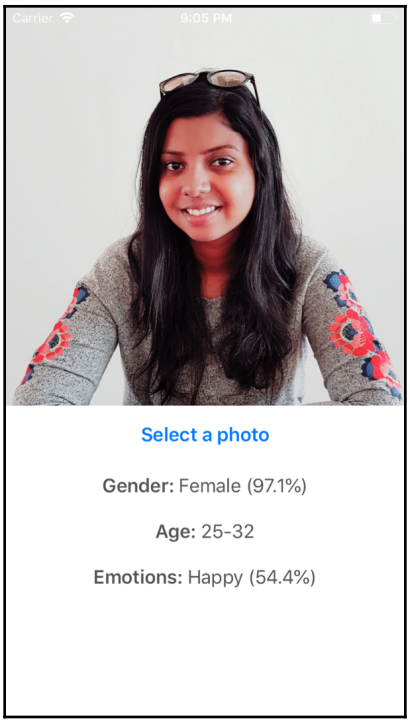

Choose a template for your new project:
iOS
watchOS
tvOS
macOS
Cross-platform
Filter
Application
Single View App
Game
Augmented Reality App
Document Based App
Master-Detail App
Page-Based App
Tabbed App
Sticker Pack App
iMessage App
Framework & Library
Cocoa Touch Framework
Cocoa Touch Static Library
Metal Library
Cancel
Previous
Next
No Selection
Cocoa Touch Class - A Cocoa Touch class
UI Test Case Class - A class implementing a unit test
Unit Test Case Class - A class implementing a unit test
Filter


Choose options for your new project:
Product Name: Classifier
Team: Karthikeyan NG (Personal Team)
Organization Name: MLmobileapps
Organization Identifier: com.mlmobileapps
Bundle Identifier: com.mlmobileapps.Classifier
Language: Swift
Use Core Data
Include Unit Tests
Include UI Tests
Cancel
Previous
Next

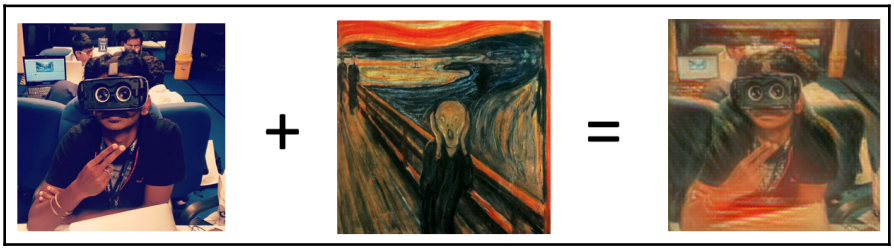

Classifier
iPhone 8 Plus
Classifier: Ready | Today at 8:02 AM
Classifier
Classifier
AppDelegate.swift
ViewController.swift
Main.storyboard
Assets.xcassets
LaunchScreen.storyboard
Info.plist
Products
General
Capabilities
Resource Tags
Info
Build Settings
Build Phases
Build Rules
PROJECT
Classifier
TARGETS
Classifier
Identity
Display Name
Classifier
Bundle Identifier
com.mlmobileapps.Classifier
Version
1.0
Build
1
Signing
Automatically manage signing
Xcode will create and update profiles, app IDs, and certificates.
Team
Karthikeyan NG (Personal Team)
Provisioning Profile
Xcode Managed Profile
Signing Certificate
iPhone Developer: Karthikeyan NG (24NPP27378)
Deployment Info
Deployment Target
11.3
Devices
Universal
Main Interface
Main
Device Orientation
Portrait
Upside Down
Landscape Left
Landscape Right
Status Bar Style
Default
Hide status bar
Requires full screen
Identity and Type
Name
Classifier
Location
Absolute
Classifier.xcodeproj
Full Path
/Users/karthikeyan/Documents/code/play/ios/classifier/Classifier/Classifier.xcodeproj
Project Document
Project Format
Xcode 9.3-compatible
Organization
MLmobileapps
Class Prefix
Text Settings
Indent Using
Spaces
Widths
4
4
Tab
Indent
Wrap lines
Cocoa Touch Class - A Cocoa Touch class
UI Test Case Class - A class implementing a unit test
Unit Test Case Class - A class implementing a unit test

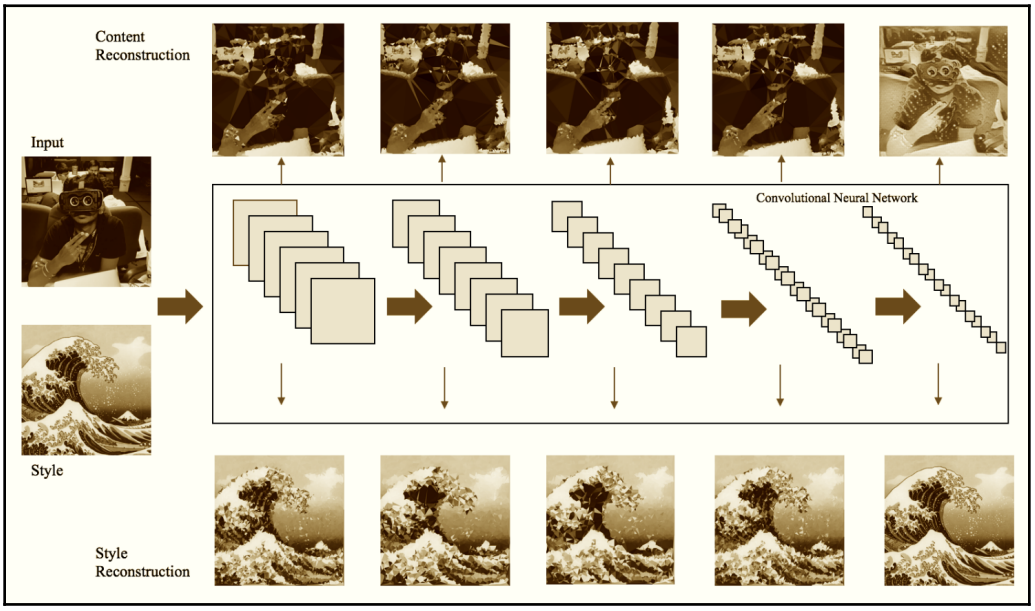

Carrier
5:03 PM
Select a photo

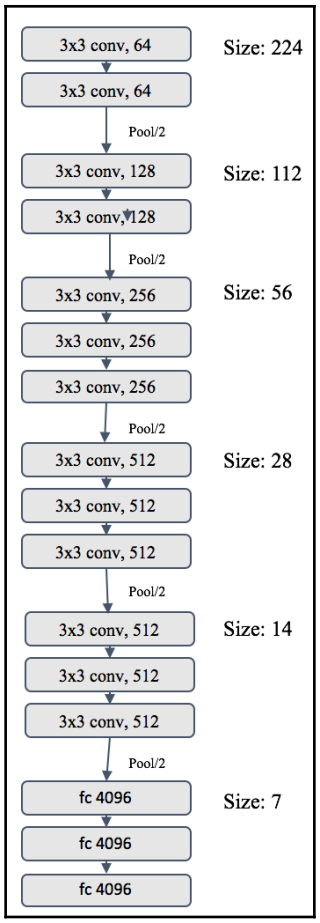

Carrier
5:03 PM
Select a photo
Snap a photo
Photo Album
Cancel

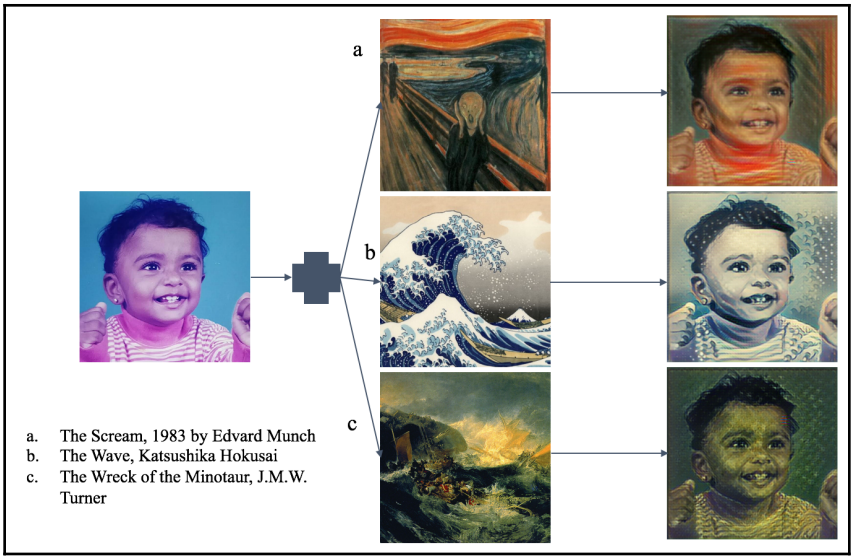

Carrier
9:05 PM
Select a photo
Gender: Female (97.1%)
Age: 25-32
Emotions: Happy (54.4%)

Chapter 3: Applying Neural Style Transfer on Photos



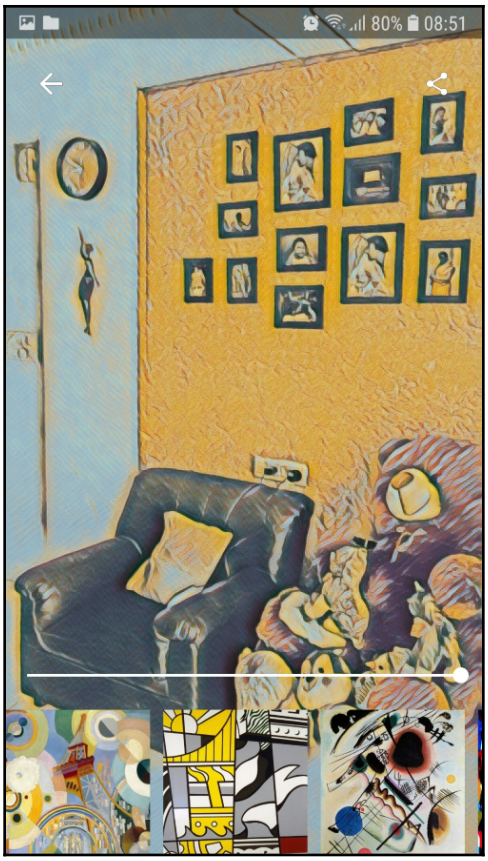



3x3 conv, 64
3x3 conv, 64
Size: 224
Pool/2
3x3 conv, 128
3x3 conv, 128
Size: 112
Pool/2
3x3 conv, 256
3x3 conv, 256
3x3 conv, 256
Size: 56
Pool/2
3x3 conv, 512
3x3 conv, 512
3x3 conv, 512
Size: 28
Pool/2
3x3 conv, 512
3x3 conv, 512
3x3 conv, 512
Size: 14
Pool/2
fc 4096
fc 4096
fc 4096
Size: 7

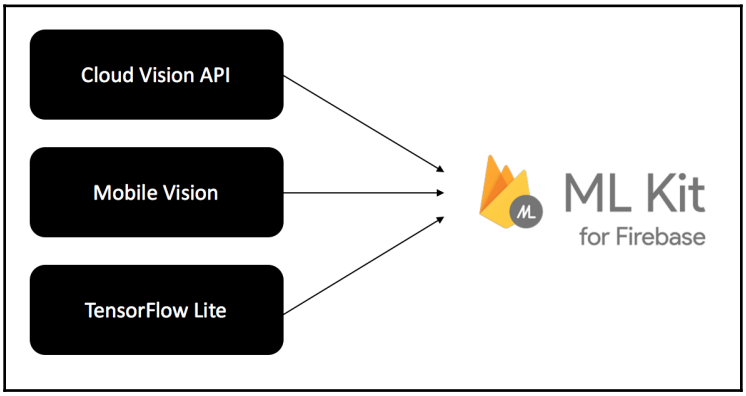

a
b
c
a. The Scream, 1983 by Edvard Munch
b. The Wave, Katsushika Hokusai
c. The Wreck of the Minotaur, J.M.W. Turner


80% 08:50

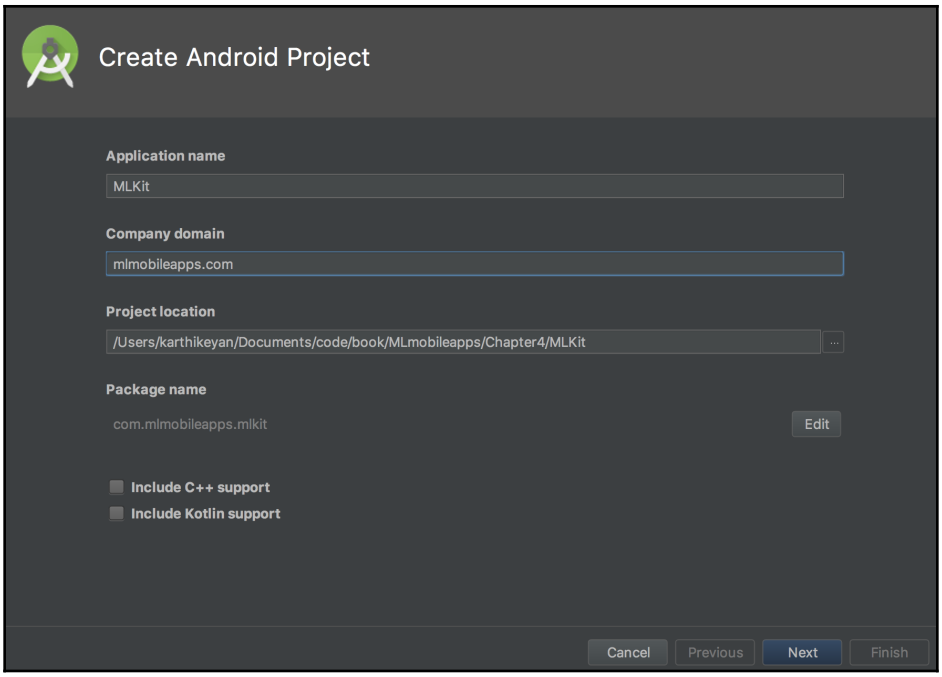

80% 08:51

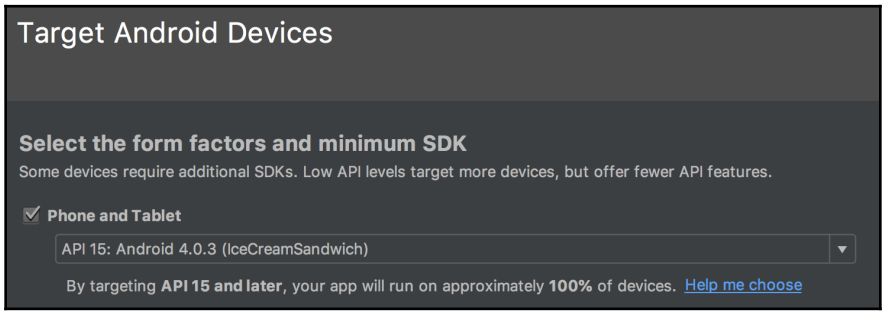

80% 08:51

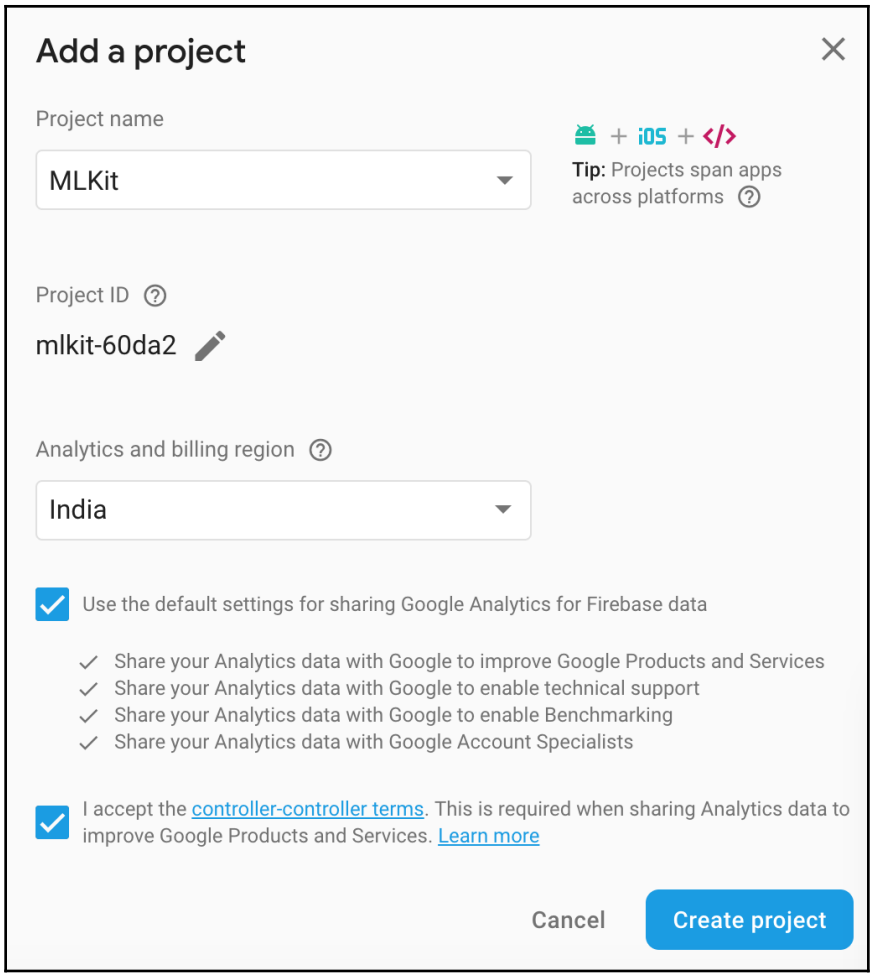
Chapter 4: Deep Diving into the ML Kit with Firebase

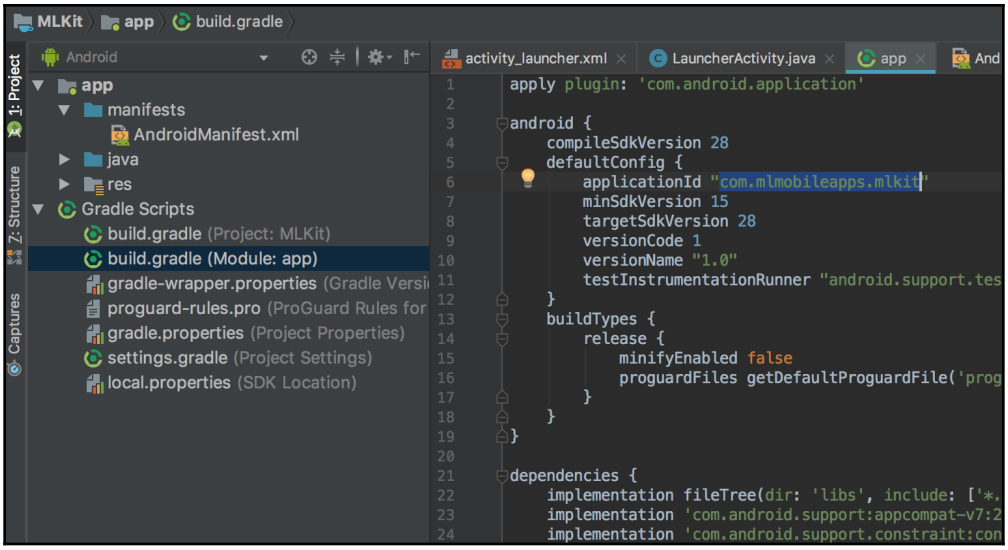


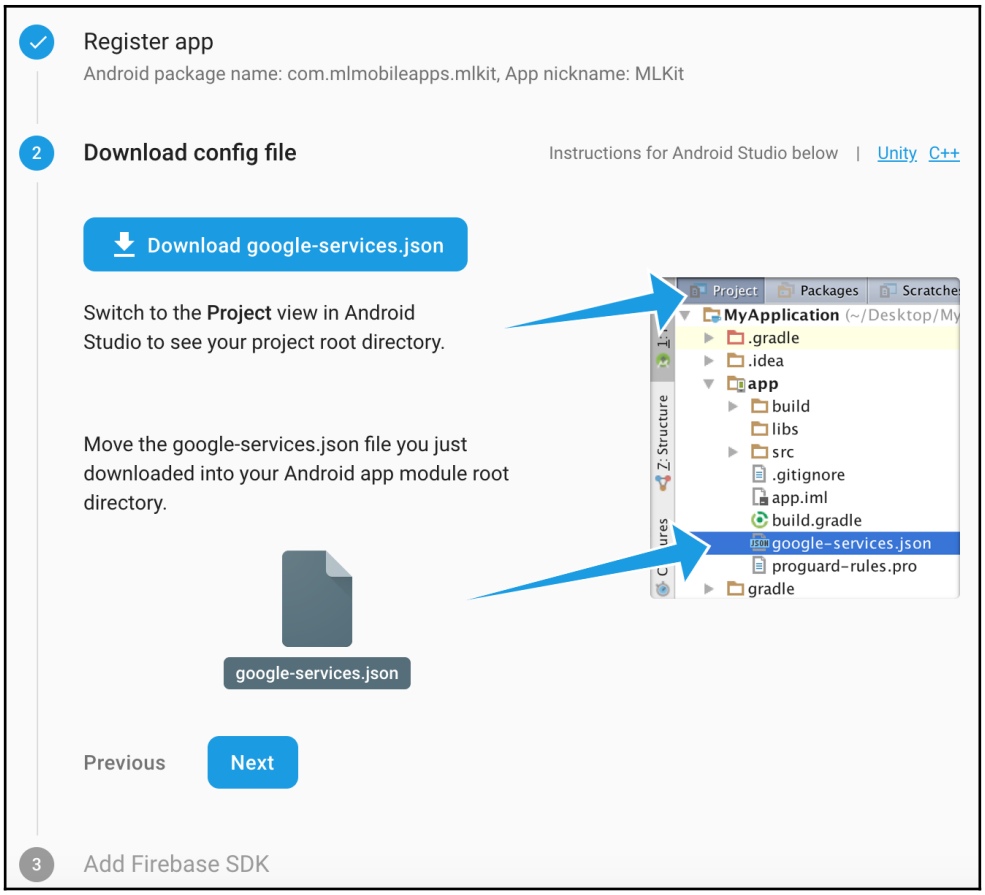
API	On-Cloud API	On-Device API
Text recognition	Yes	Yes
Face detection	No	Yes
Barcode scanning	No	Yes
Image labelling	Yes	Yes
Landmark detection	Yes	No
Custom TensorFlow Lite model	No	Yes

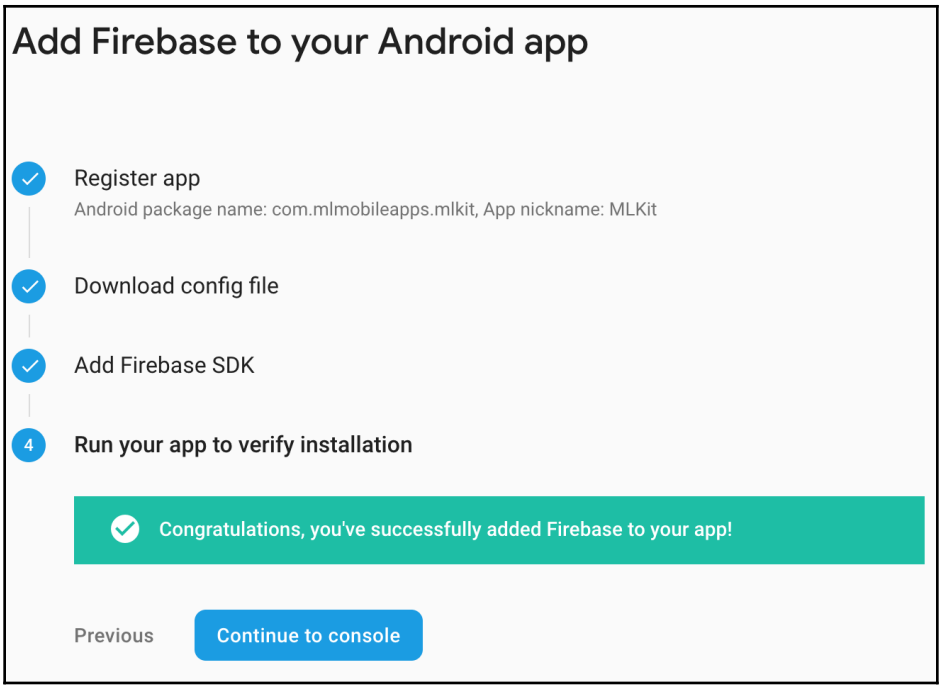

Create Android Project
Application name
MLKit
Company domain
mlmobileapps.com
Project location
/Users/karthikeyan/Documents/code/book/MLmobileapps/Chapter4/MLKit
Package name
com.mlmobileapps.mlkit
Edit
Include C++ support
Include Kotlin support
Cancel
Previous
Next
Finish


Target Android Devices
Select the form factors and minimum SDK
Some devices require additional SDKs. Low API levels target more devices, but offer fewer API features.
Phone and Tablet
API 15: Android 4.0.3 (IceCreamSandwich)
By targeting API 15 and later, your app will run on approximately 100% of devices. Help me choose

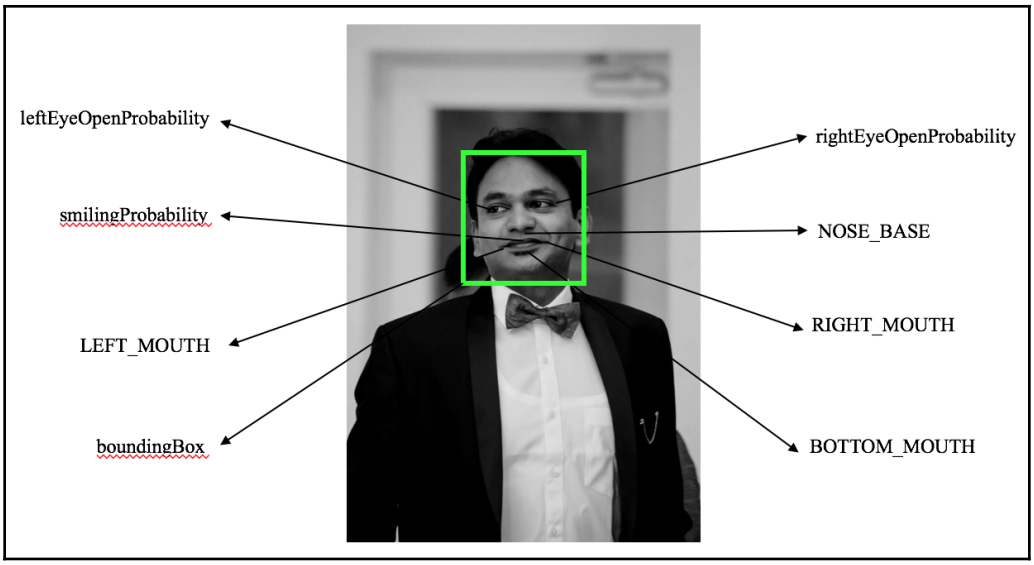

Add a project
Project name
MLKit
+ iOS + </>
Tip: Projects span apps across platforms
Project ID
mlkit-60da2
Analytics and billing region
India
Use the default settings for sharing Google Analytics for Firebase data
Share your Analytics data with Google to improve Google Products and Services
Share your Analytics data with Google to enable technical support
Share your Analytics data with Google to enable Benchmarking
Share your Analytics data with Google Account Specialists
I accept the controller-controller terms. This is required when sharing Analytics data to improve Google Products and Services. Learn more
Cancel
Create project

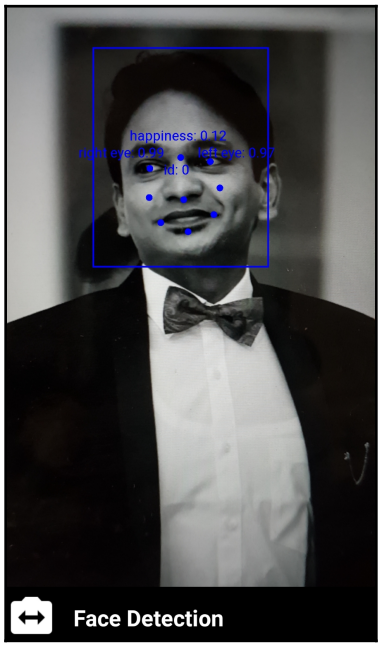

MLKit
app
build.gradle
Android
app
manifests
AndroidManifest.xml
java
res
Gradle Scripts
build.gradle (Project: MLKit)
build.gradle (Module: app)
gradle-wrapper.properties (Gradle Versi
proguard-rules.pro (ProGuard Rules for
gradle.properties (Project Properties)
settings.gradle (Project Settings)
local.properties (SDK Location)
activity_launcher.xml
LauncherActivity.java
app
And
apply plugin: 'com.android.application'
android {
compileSdkVersion 28
defaultConfig {
applicationId "com.mlmobileapps.mlkit"
minSdkVersion 15
targetSdkVersion 28
versionCode 1
versionName "1.0"
testInstrumentationRunner "android.support.tes
}
buildTypes {
release {
minifyEnabled false
proguardFiles getDefaultProguardFile('prog
}
}
}
dependencies {
implementation fileTree(dir: 'libs', include: ['*.
implementation 'com.android.support:appcompat-v7:2
implementation 'com.android.support.constraint:con
1: Project
7: Structure
Captures

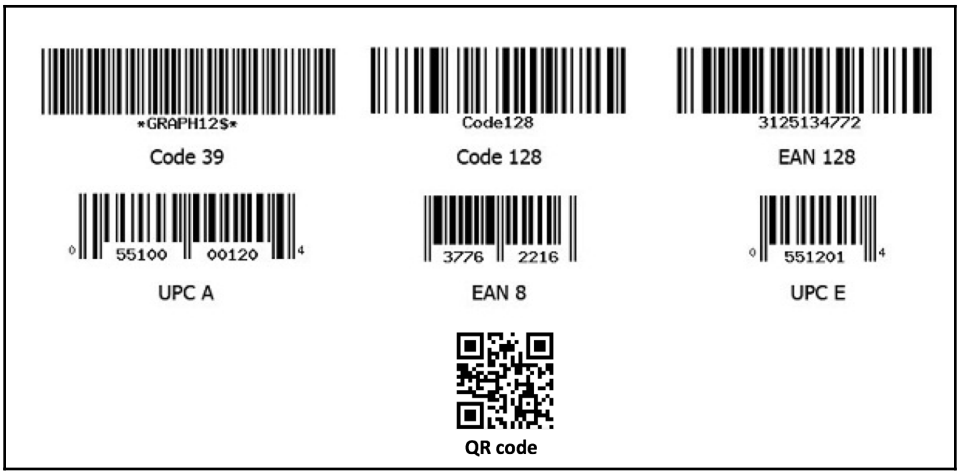

Register app
Android package name: com.mlmobileapps.mlkit, App nickname: MLKit
2
Download config file
Instructions for Android Studio below | Unity C++
Download google-services.json
Switch to the Project view in Android Studio to see your project root directory.
Move the google-services.json file you just downloaded into your Android app module root directory.
google-services.json
Previous
Next
3
Add Firebase SDK
Project
Packages
MyApplication (~/Desktop/My
.gradle
.idea
app
build
libs
src
.gitignore
app.iml
build.gradle
google-services.json
proguard-rules.pro
gradle
Z: Structure



	< -36 degrees	-36 to -12 degrees	-12 to 12 degrees	12 to 36 degrees	> 36 degrees
Left Eye	Yes	Yes	Yes	Yes	No
Right Eye	No	Yes	Yes	Yes	Yes
Left Mouth	Yes	Yes	Yes	No	No
Right Mouth	No	No	Yes	Yes	Yes
Bottom Mouth	No	Yes	Yes	Yes	No
Left Ear	Yes	Yes	No	No	No
Right Ear	No	No	No	Yes	Yes
Nose Base	Yes	Yes	Yes	Yes	Yes
Left Cheek	Yes	Yes	Yes	No	No
Right Cheek	No	No	Yes	Yes	Yes


leftEyeOpenProbability
smilingProbability
LEFT_MOUTH
boundingBox
rightEyeOpenProbability
NOSE_BASE
RIGHT_MOUTH
BOTTOM_MOUTH

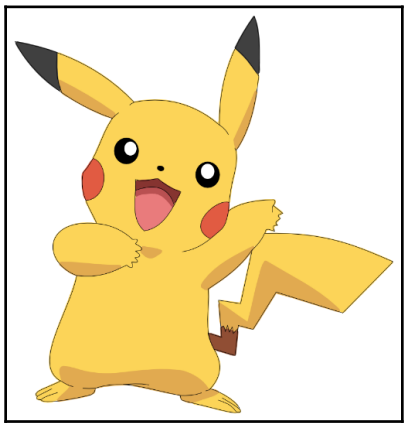

happiness: 0.12
Face Detection


GRAPH12$
Code 39
Code128
Code 128
3125134772
EAN 128
55100 00120
UPC A
3776 2216
EAN 8
551201
UPC E
QR code


Made in China
Barcode Detection

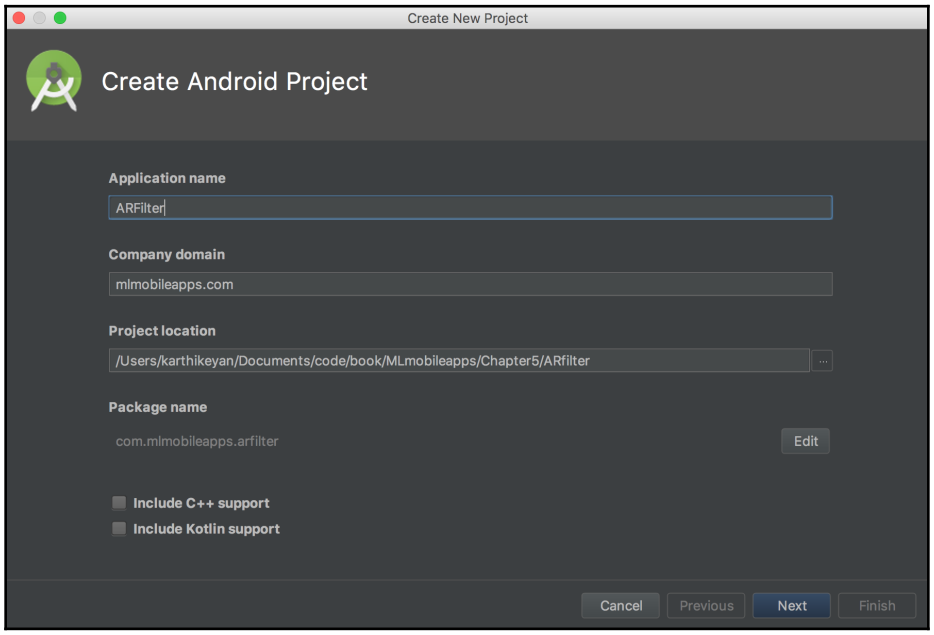

KHARDUNGLA
VIEW POINT
Text Detection

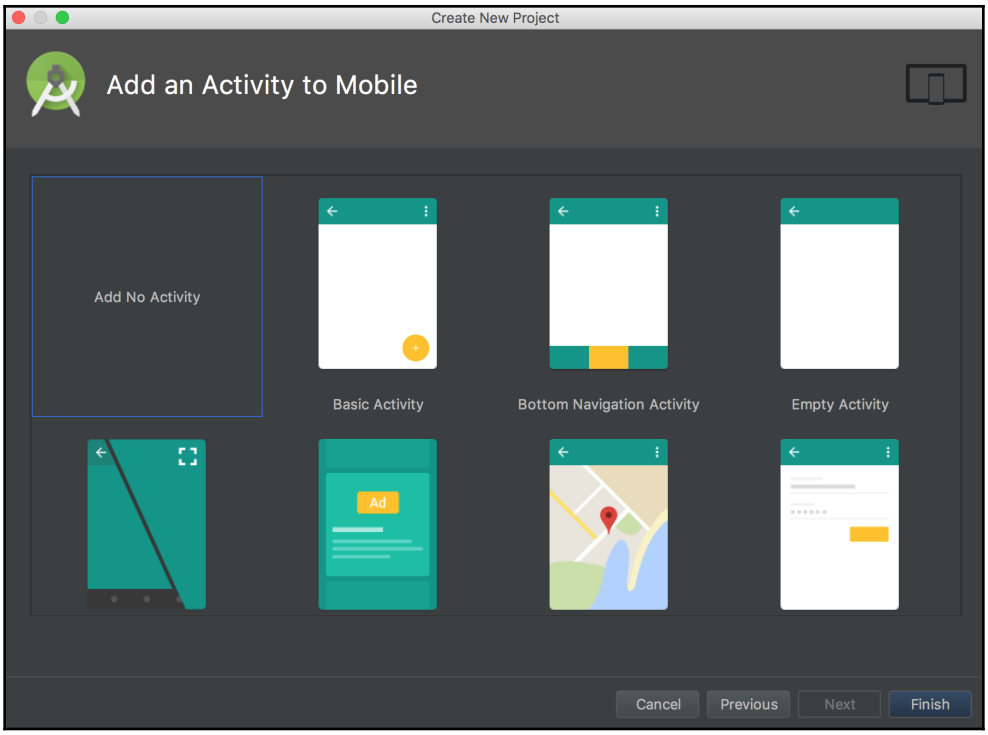
Chapter 5: A Snapchat-Like AR Filter on Android

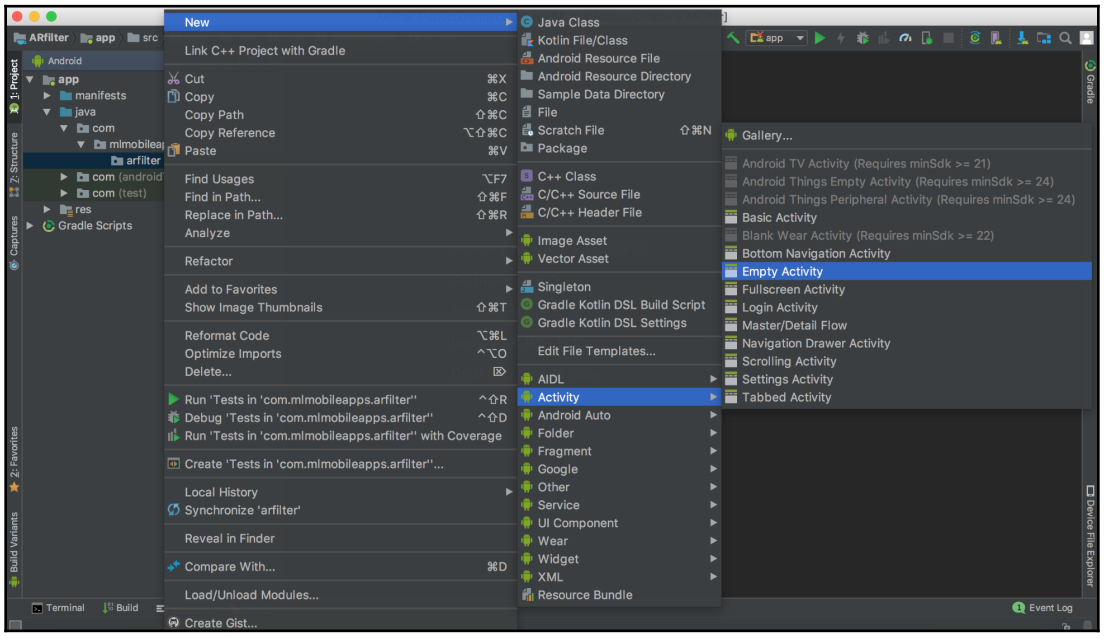


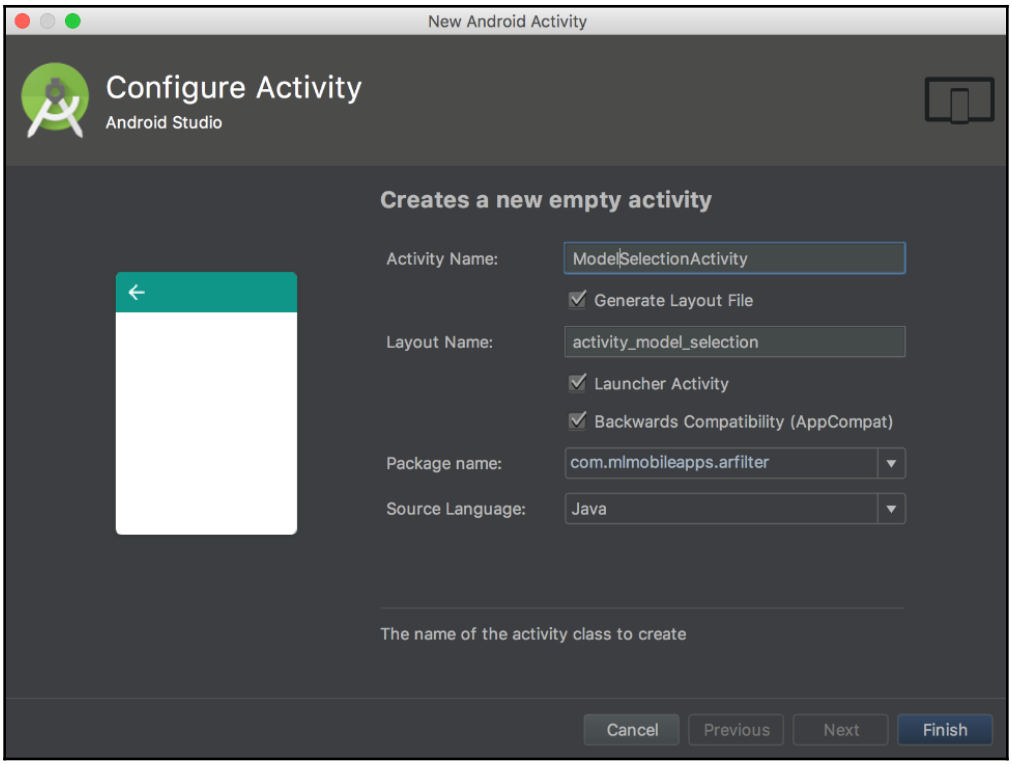
Version	MACs(millions)	Parameters(millions)
MobileNet V1	569	4.24
MobileNet V2	300	3.47

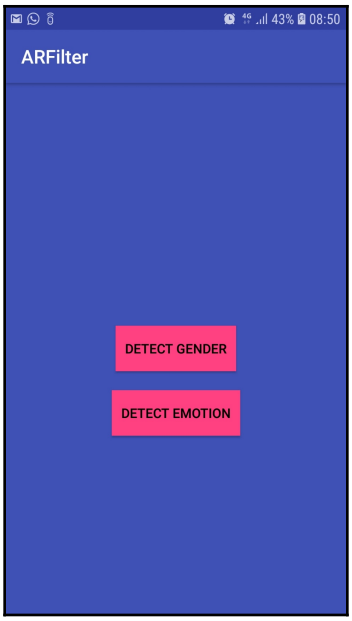
Version	Top 1 accuracy	Top 5 accuracy
MobileNet V1	70.9	89.9
MobileNet V2	71.8	91.0

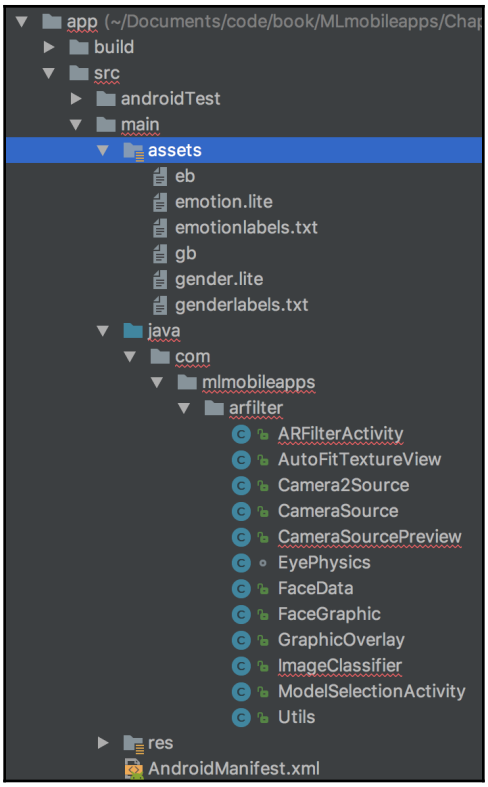



Create New Project
Add an Activity to Mobile
Add No Activity
Basic Activity
Bottom Navigation Activity
Empty Activity
Ad
Cancel
Previous
Next
Finish


New
Link C++ Project with Gradle
Cut
Copy
Copy Path
Copy Reference
Paste
Find Usages
Find in Path...
Replace in Path...
Analyze
Refactor
Add to Favorites
Show Image Thumbnails
Reformat Code
Optimize Imports
Delete...
Run 'Tests in 'com.mlmobileapps.arfilter''
Debug 'Tests in 'com.mlmobileapps.arfilter''
Run 'Tests in 'com.mlmobileapps.arfilter'' with Coverage
Create 'Tests in 'com.mlmobileapps.arfilter''...
Local History
Synchronize 'arfilter'
Reveal in Finder
Compare With...
Load/Unload Modules...
Create Gist...
Java Class
Kotlin File/Class
Android Resource File
Android Resource Directory
Sample Data Directory
File
Scratch File
Package
C++ Class
C/C++ Source File
C/C++ Header File
Image Asset
Vector Asset
Singleton
Gradle Kotlin DSL Build Script
Gradle Kotlin DSL Settings
Edit File Templates...
AIDL
Activity
Android Auto
Folder
Fragment
Google
Other
Service
UI Component
Wear
Widget
XML
Resource Bundle
Gallery...
Android TV Activity (Requires minSdk >= 21)
Android Things Empty Activity (Requires minSdk >= 24)
Android Things Peripheral Activity (Requires minSdk >= 24)
Basic Activity
Blank Wear Activity (Requires minSdk >= 22)
Bottom Navigation Activity
Empty Activity
Fullscreen Activity
Login Activity
Master/Detail Flow
Navigation Drawer Activity
Scrolling Activity
Settings Activity
Tabbed Activity


New Android Activity
Configure Activity
Android Studio
Creates a new empty activity
Activity Name:
ModelSelectionActivity
Generate Layout File
Layout Name:
activity_model_selection
Launcher Activity
Backwards Compatibility (AppCompat)
Package name:
com.mlmobileapps.arfilter
Source Language:
Java
The name of the activity class to create
Cancel
Previous
Next
Finish

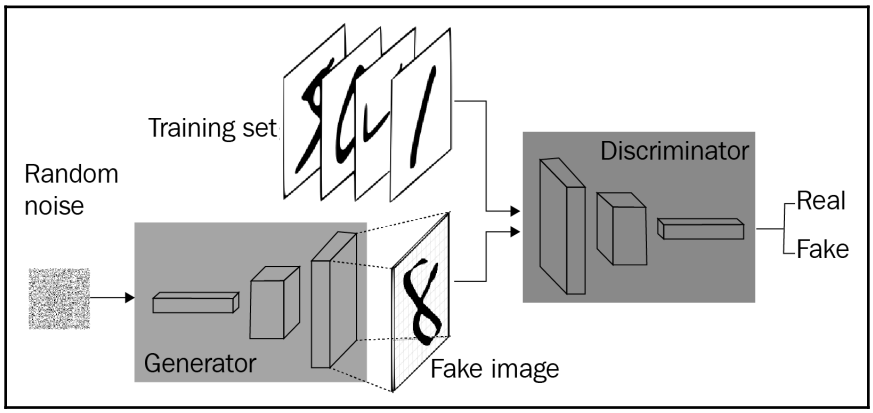

43% 08:50
ARFilter
DETECT GENDER
DETECT EMOTION

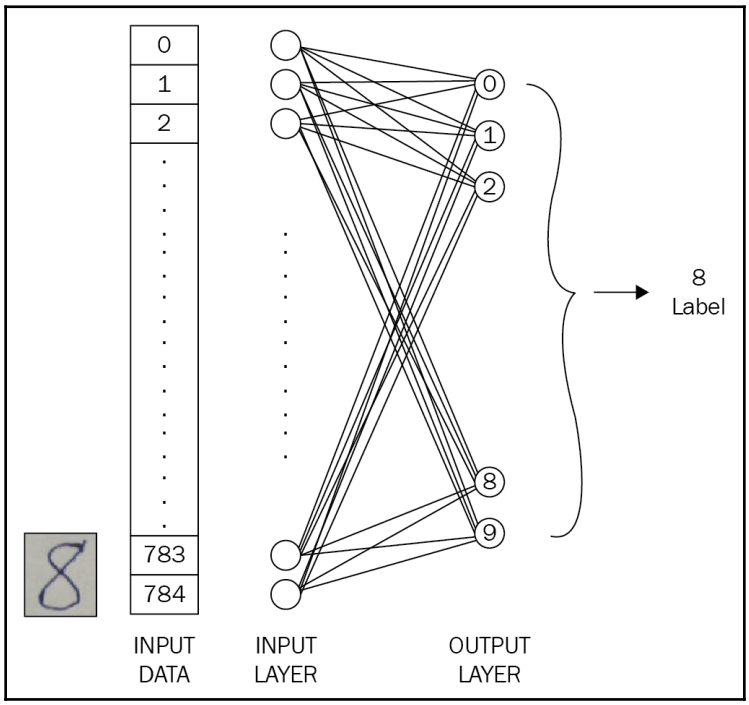

app (~/Documents/code/book/MLmobileapps/Chap
build
src
androidTest
main
assets
eb
emotion.lite
emotionlabels.txt
gb
gender.lite
genderlabels.txt
java
com
mlmobileapps
arfilter
ARFilterActivity
AutoFitTextureView
Camera2Source
CameraSource
CameraSourcePreview
EyePhysics
FaceData
FaceGraphic
GraphicOverlay
ImageClassifier
ModelSelectionActivity
Utils
res
AndroidManifest.xml


ARFilter
Camera 2
65ms
male: 59%
female: 41%

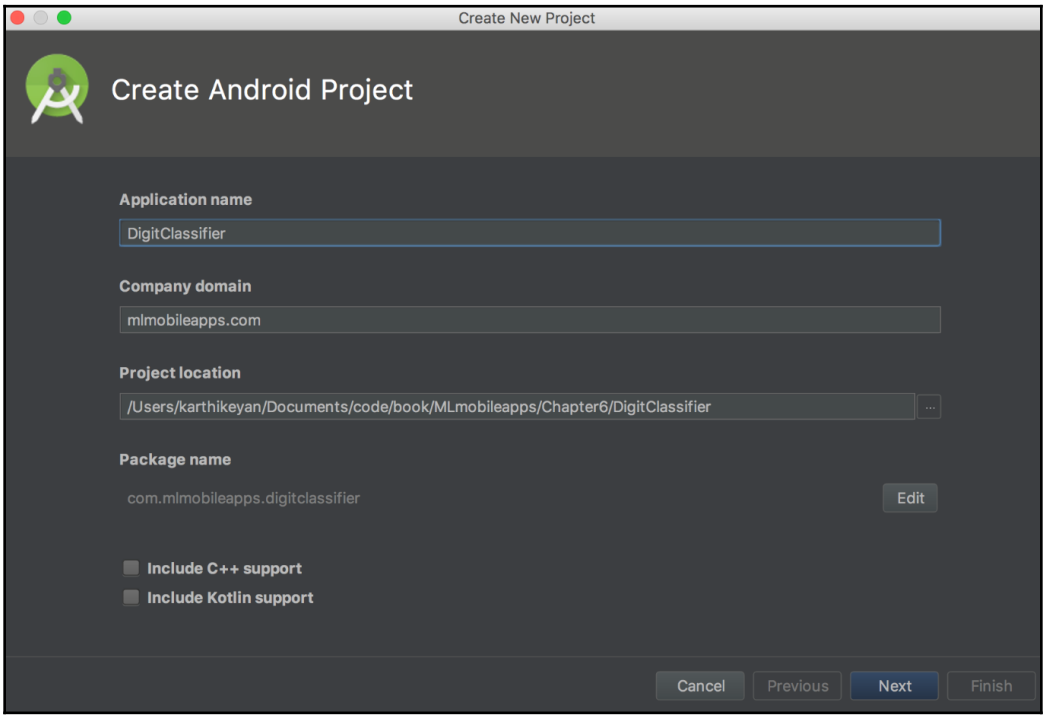

ARFilter
Camera 2
42ms
female: 93%
male: 7%

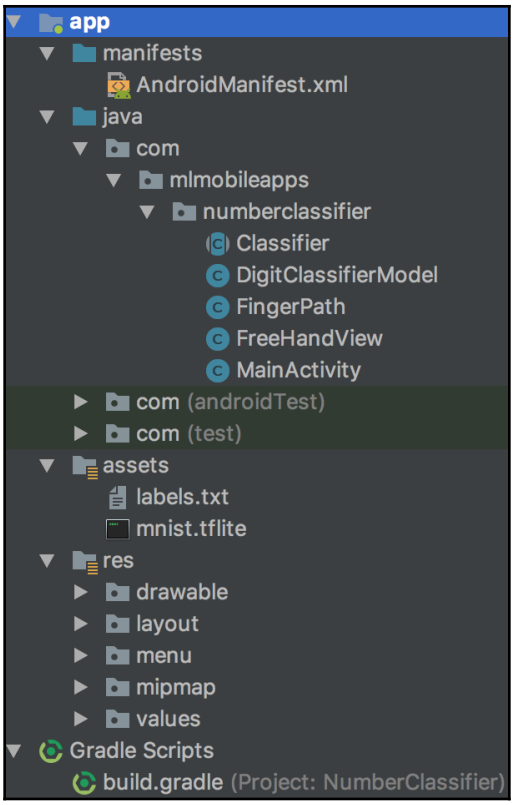
Chapter 6: Handwritten Digit Classifier Using Adversarial Learning

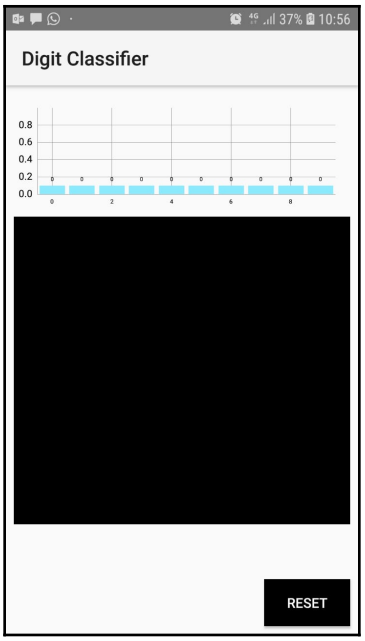




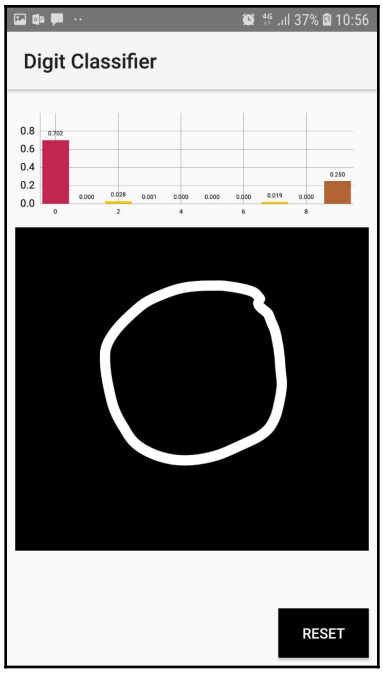
Object	Probability
Apple	0.05
Car	0.80
Sunflower	0.01
Cup	0.14

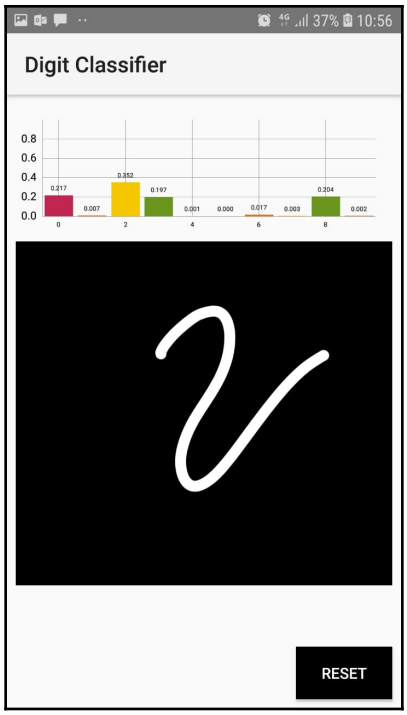



app
manifests
AndroidManifest.xml
java
com
mlmobileapps
numberclassifier
Classifier
DigitClassifierModel
FingerPath
FreeHandView
MainActivity
com (androidTest)
com (test)
assets
labels.txt
mnist.tflite
res
drawable
layout
menu
mipmap
values
Gradle Scripts
build.gradle (Project: NumberClassifier)

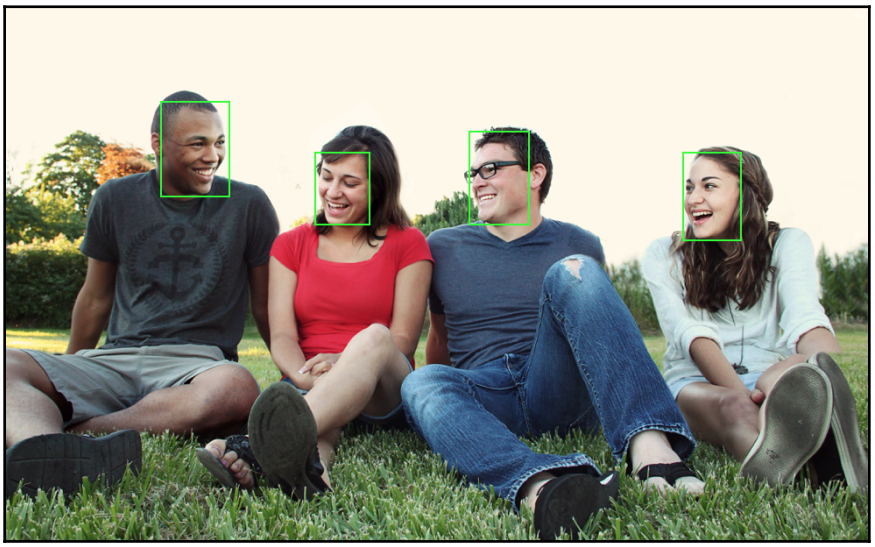

37% 10:56
Digit Classifier
0.8
0.6
0.4
0.2
0.0
RESET

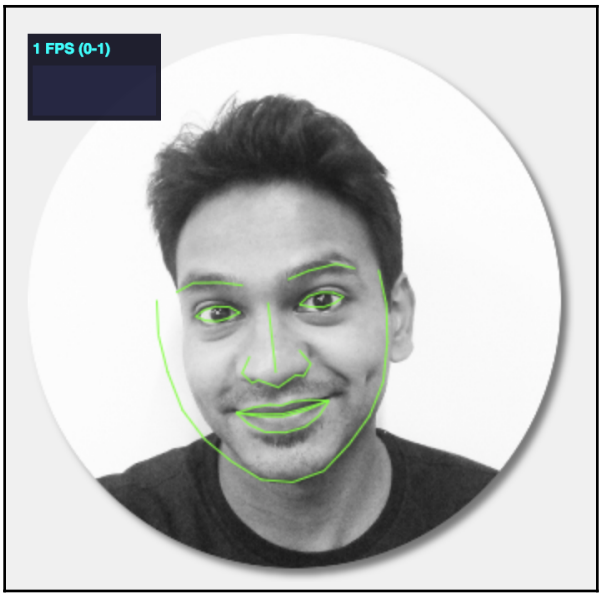

37% 10:56
Digit Classifier
1.00
0.8
0.6
0.4
0.2
0.0
RESET

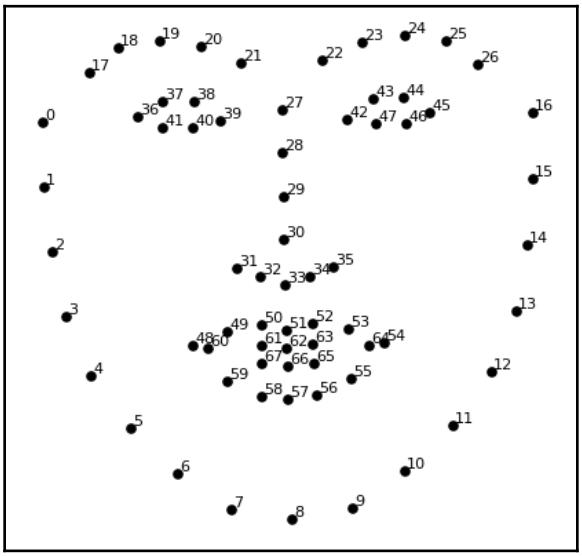

37% 10:56
Digit Classifier
0.8
0.6
0.4
0.2
0.0
0.702
0.000
0.028
0.001
0.000
0.000
0.000
0.019
0.000
0.250
0
2
4
6
8
RESET


37% 10:56
Digit Classifier
0.8
0.6
0.4
0.2
0.0
0.217
0.007
0.352
0.197
0.001
0.000
0.017
0.003
0.204
0.002
0
2
4
6
8
RESET

Chapter 7: Face-Swapping with Your Friends Using OpenCV




1 FPS (0-1)


0
1
2
3
4
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11
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19
20
21
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23
24
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26
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44
45
46
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49
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51
52
53
54
55
56
57
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63
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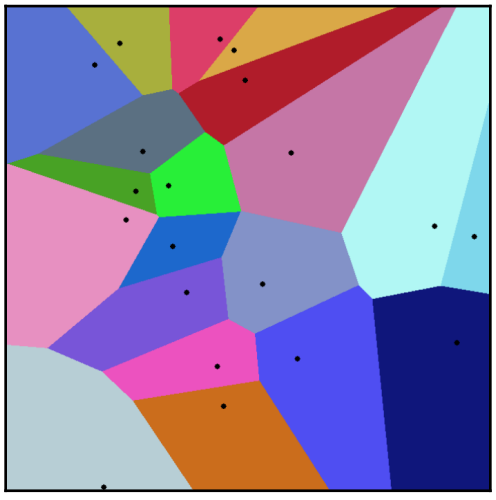
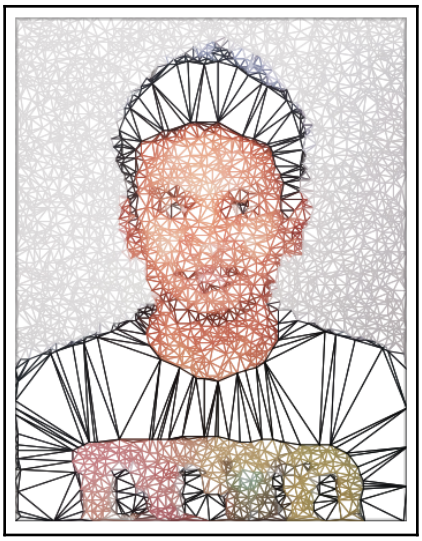
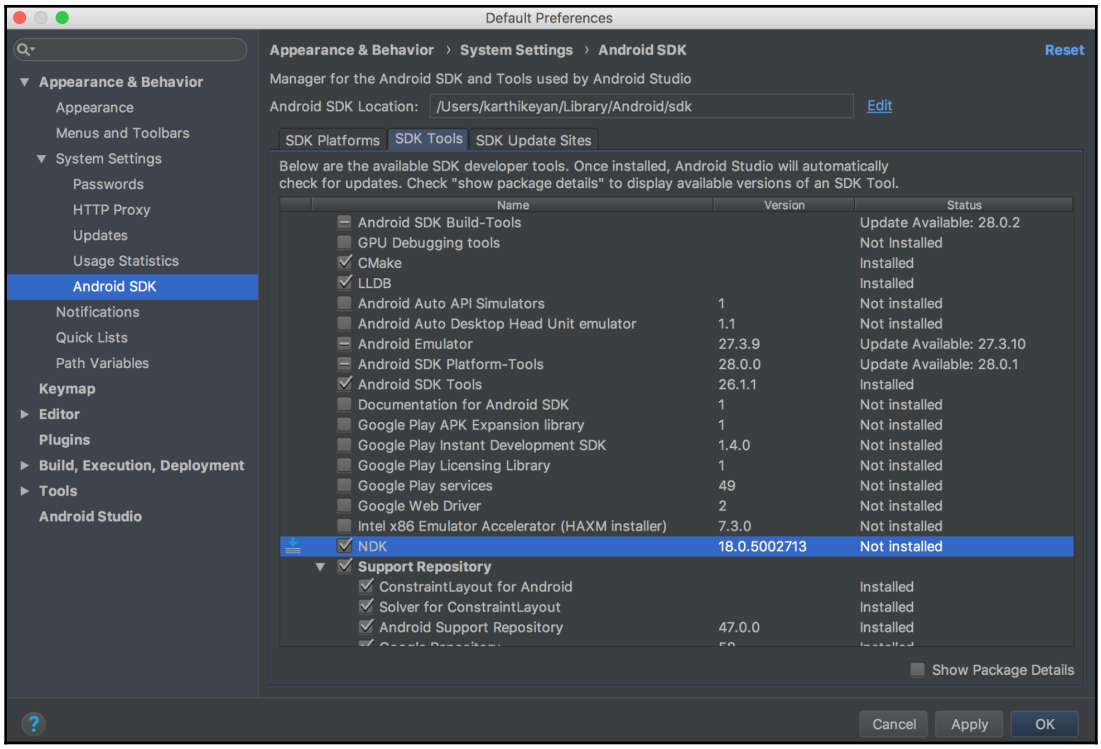
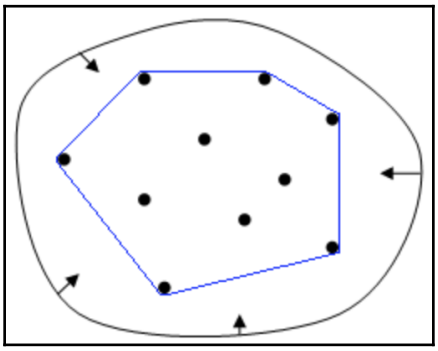
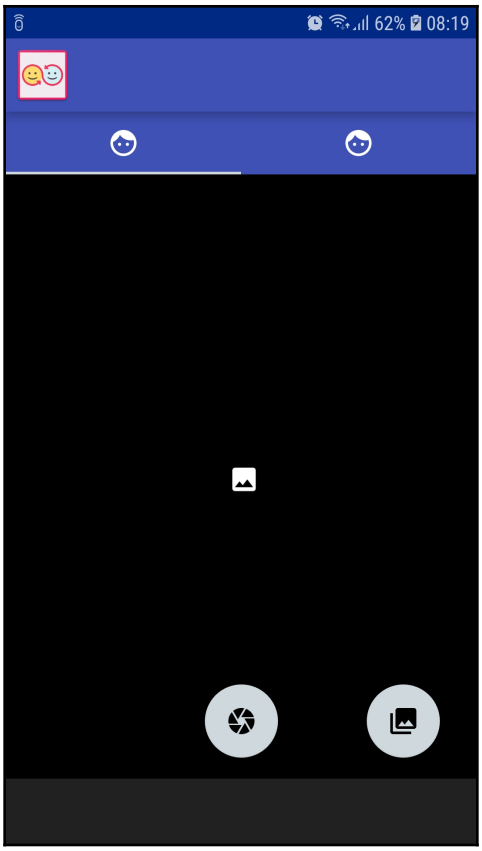
65
66
67

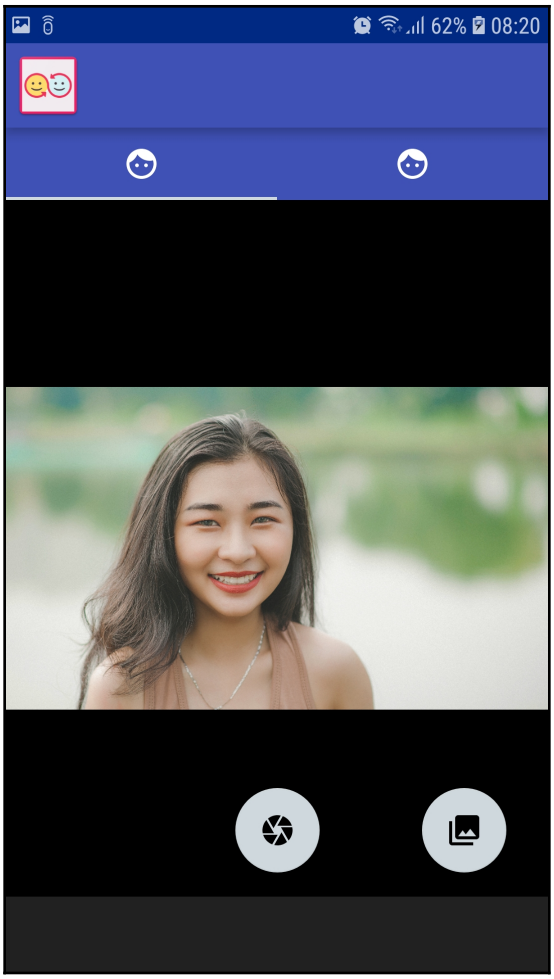




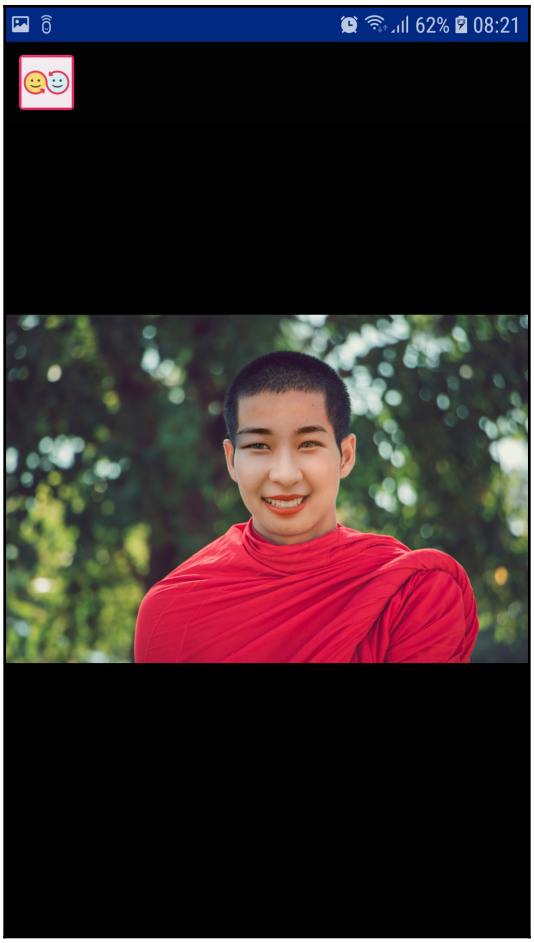

Default Preferences
Appearance & Behavior
Appearance
Menus and Toolbars
System Settings
Passwords
HTTP Proxy
Updates
Usage Statistics
Android SDK
Notifications
Quick Lists
Path Variables
Keymap
Editor
Plugins
Build, Execution, Deployment
Tools
Android Studio
Appearance & Behavior › System Settings › Android SDK
Reset
Manager for the Android SDK and Tools used by Android Studio
Android SDK Location: /Users/karthikeyan/Library/Android/sdk
Edit
SDK Platforms
SDK Tools
SDK Update Sites
Below are the available SDK developer tools. Once installed, Android Studio will automatically check for updates. Check "show package details" to display available versions of an SDK Tool.
Name
Version
Status
Android SDK Build-Tools
Update Available: 28.0.2
GPU Debugging tools
Not Installed
CMake
Installed
LLDB
Installed
Android Auto API Simulators
1
Not installed
Android Auto Desktop Head Unit emulator
1.1
Not installed
Android Emulator
27.3.9
Update Available: 27.3.10
Android SDK Platform-Tools
28.0.0
Update Available: 28.0.1
Android SDK Tools
26.1.1
Installed
Documentation for Android SDK
1
Not installed
Google Play APK Expansion library
1
Not installed
Google Play Instant Development SDK
1.4.0
Not installed
Google Play Licensing Library
1
Not installed
Google Play services
49
Not installed
Google Web Driver
2
Not installed
Intel x86 Emulator Accelerator (HAXM installer)
7.3.0
Not installed
NDK
18.0.5002713
Not installed
Support Repository
ConstraintLayout for Android
Installed
Solver for ConstraintLayout
Installed
Android Support Repository
47.0.0
Installed
Show Package Details
Cancel
Apply
OK



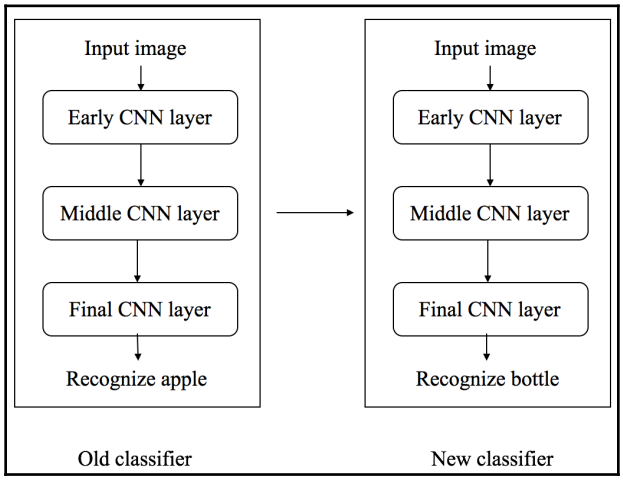

62% 08:19


62% 08:20

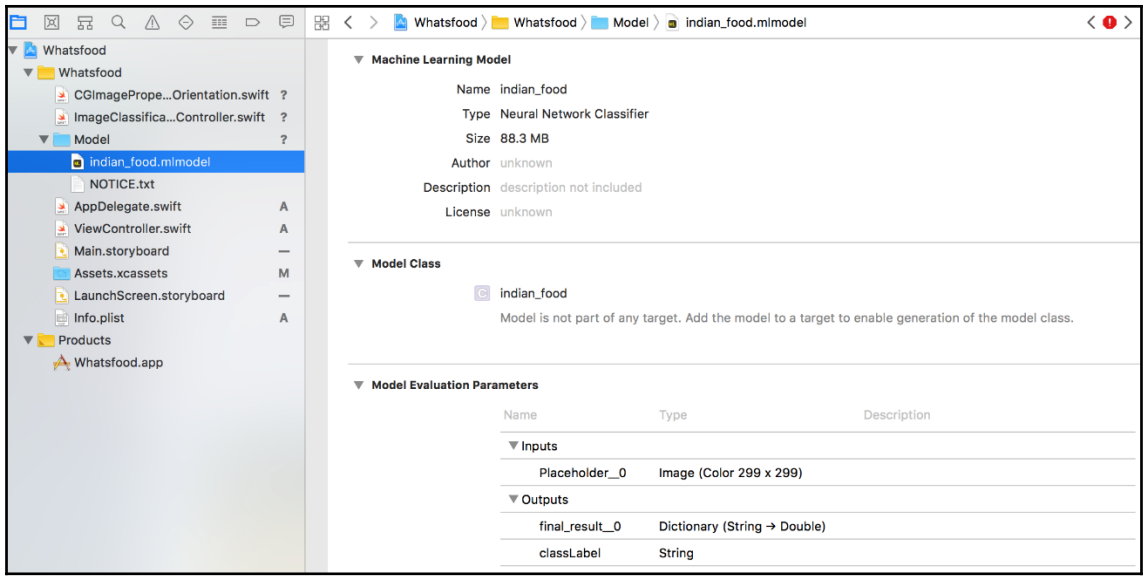

62% 08:20

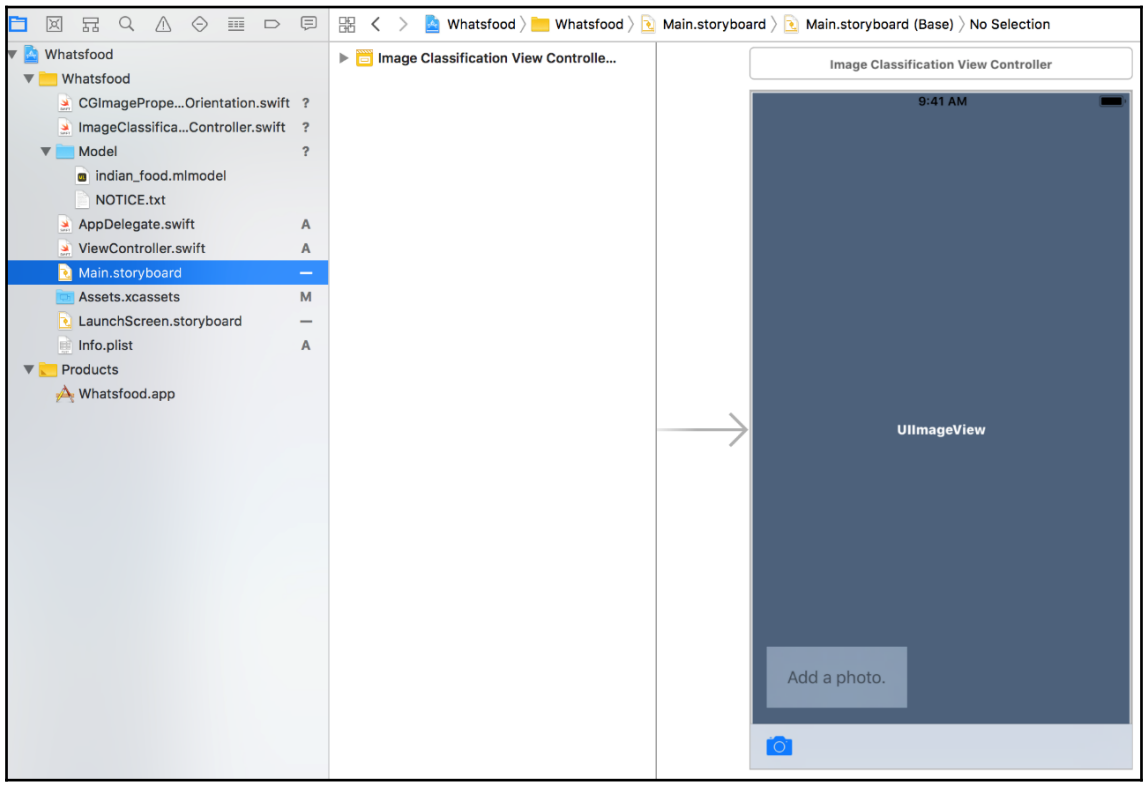

62% 08:21

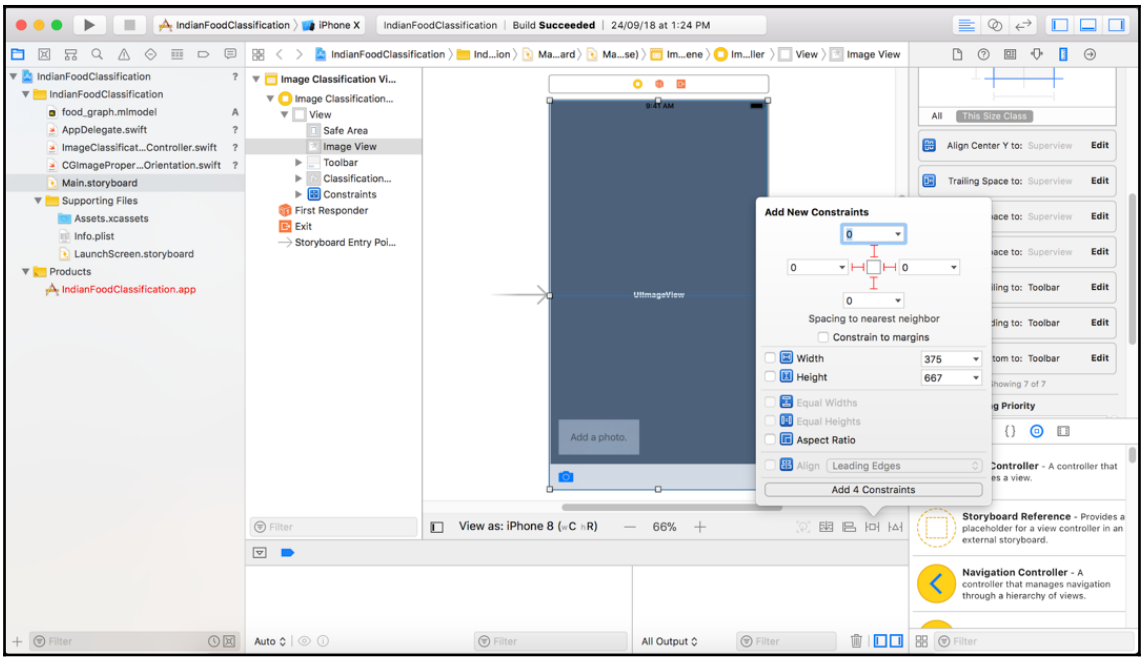
Chapter 8: Classifying Food Using Transfer Learning

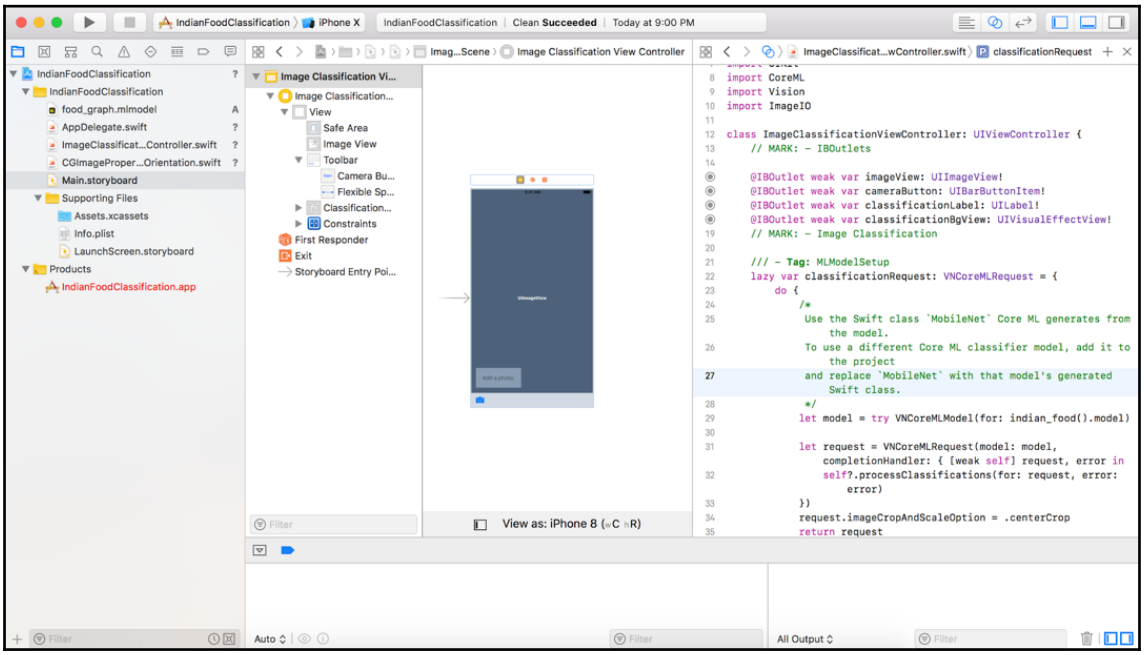


Model	Million MACs	Million Parameters	Top-1 Accuracy	Top-5 Accuracy
MobileNet_v1_1.0_224	569	4.24	70.9	89.9
MobileNet_v1_1.0_192	418	4.24	70.0	89.2
MobileNet_v1_1.0_160	291	4.24	68.0	87.7
MobileNet_v1_1.0_128	186	4.24	65.2	85.8
MobileNet_v1_0.75_224	317	2.59	68.4	88.2
MobileNet_v1_0.75_192	233	2.59	67.2	87.3
MobileNet_v1_0.75_160	162	2.59	65.3	86.0
MobileNet_v1_0.75_128	104	2.59	62.1	83.9
MobileNet_v1_0.50_224	150	1.34	63.3	84.9
MobileNet_v1_0.50_192	110	1.34	61.7	83.6
MobileNet_v1_0.50_160	77	1.34	59.1	81.9
MobileNet_v1_0.50_128	49	1.34	56.3	79.4
MobileNet_v1_0.25_224	41	0.47	49.8	74.2
MobileNet_v1_0.25_192	34	0.47	47.7	72.3
MobileNet_v1_0.25_160	21	0.47	45.5	70.3
MobileNet_v1_0.25_128	14	0.47	41.5	66.3


Whatsfood
Whatsfood
CGImagePrope...Orientation.swift
ImageClassifica...Controller.swift
Model
indian_food.mlmodel
NOTICE.txt
AppDelegate.swift
ViewController.swift
Main.storyboard
Assets.xcassets
LaunchScreen.storyboard
Info.plist
Products
Whatsfood.app
Whatsfood 〉 Whatsfood 〉 Model 〉 indian_food.mlmodel
Machine Learning Model
Name indian_food
Type Neural Network Classifier
Size 88.3 MB
Author unknown
Description description not included
License unknown
Model Class
indian_food
Model is not part of any target. Add the model to a target to enable generation of the model class.
Model Evaluation Parameters
Name
Type
Description
Inputs
Placeholder__0
Image (Color 299 x 299)
Outputs
final_result__0
Dictionary (String → Double)
classLabel
String


Whatsfood
Whatsfood
CGImagePrope...Orientation.swift
ImageClassifica...Controller.swift
Model
indian_food.mlmodel
NOTICE.txt
AppDelegate.swift
ViewController.swift
Main.storyboard
Assets.xcassets
LaunchScreen.storyboard
Info.plist
Products
Whatsfood.app
Whatsfood 〉 Whatsfood 〉 Main.storyboard 〉 Main.storyboard (Base) 〉 No Selection
Image Classification View Controlle...
Image Classification View Controller
9:41 AM
UIImageView
Add a photo.


IndianFoodClassification
iPhone X
IndianFoodClassification | Build Succeeded | 24/09/18 at 1:24 PM
food_graph.mlmodel
AppDelegate.swift
ImageClassificat...Controller.swift
CGImageProper...Orientation.swift
Main.storyboard
Supporting Files
Assets.xcassets
Info.plist
LaunchScreen.storyboard
Products
IndianFoodClassification.app
Image Classification Vi...
Image Classification...
View
Safe Area
Image View
Toolbar
Classification...
Constraints
First Responder
Exit
Storyboard Entry Poi...
UIImageView
Add a photo.
Add New Constraints
Spacing to nearest neighbor
Constrain to margins
Width
Height
Equal Widths
Equal Heights
Aspect Ratio
Align
Leading Edges
Add 4 Constraints
View as: iPhone 8
66%
Storyboard Reference - Provides a placeholder for a view controller in an external storyboard.
Navigation Controller - A controller that manages navigation through a hierarchy of views.


IndianFoodClassification
iPhone X
IndianFoodClassification | Clean Succeeded | Today at 9:00 PM
Imag...Scene
Image Classification View Controller
ImageClassificat...wController.swift
classificationRequest
food_graph.mlmodel
AppDelegate.swift
ImageClassificat...Controller.swift
CGImageProper...Orientation.swift
Main.storyboard
Supporting Files
Assets.xcassets
Info.plist
LaunchScreen.storyboard
Products
IndianFoodClassification.app
Image Classification Vi...
Image Classification...
View
Safe Area
Image View
Toolbar
Camera Bu...
Flexible Sp...
Classification...
Constraints
First Responder
Exit
Storyboard Entry Poi...
View as: iPhone 8
import CoreML
import Vision
import ImageIO
class ImageClassificationViewController: UIViewController {
// MARK: - IBOutlets
@IBOutlet weak var imageView: UIImageView!
@IBOutlet weak var cameraButton: UIBarButtonItem!
@IBOutlet weak var classificationLabel: UILabel!
@IBOutlet weak var classificationBgView: UIVisualEffectView!
// MARK: - Image Classification
/// - Tag: MLModelSetup
lazy var classificationRequest: VNCoreMLRequest = {
do {
/*
Use the Swift class `MobileNet` Core ML generates from the model.
To use a different Core ML classifier model, add it to the project
and replace `MobileNet` with that model's generated Swift class.
*/
let model = try VNCoreMLModel(for: indian_food().model)
let request = VNCoreMLRequest(model: model, completionHandler: { [weak self] request, error in
self?.processClassifications(for: request, error: error)
})
request.imageCropAndScaleOption = .centerCrop
return request


6:56
Classification:
(1.00) biriyani
(0.00) paneerbuttermasala


7:28
Classification:
(0.01) idli vada
(0.01) lollipops