Big Data Analytical project for Climate Change Awareness

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Team Member : Naravula Loganathan,Barath - 28
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Framework Specification

Objectives

- **Project Objectives:**

The main objective of project is to create awareness for the climate change impact, presenting adaptation solution. This project provides science-based environmental education resource with credible information in form of 360 video and image with support of assistant which is trained to answer question related to environment and climate change, thereby creating in-depth experience in virtual reality for user.

- **Project Motivation:**

The climate-change awareness that have emerged in the wake of massive fossil-fuel based industrialization indicate the need for a transition to sustainable energy, but attempts to create awareness and encourage people to follow pro-environmental behavior often have been limited and narrow reach of people and achieve only limited success. This problem of limited success is due to lack of awareness in people about its risk and danger that directly connected to climate change to them ,upcoming generation and ecosystem.

This motivated us as create a big data analytics cum VR project for climate change awareness by bring all facts and its dangers effect on ecosystem to their own reality , so that they can feel it as if they are standing in melting glacier in Greenland, Sea-level rise or Extreme drought land in Africa and list is long.

"This is not just Academic project , but The project to save our Earth"

- **Significance / Uniqueness :**
    1. Bringing Real-world Reality to our Virtual Reality
    2. Interactive video presenting well-categorized section of Evidence, Cause, Effects, Scientific consequence, Vital Sign also with Remedies and Solution
    3. Presenting Facts from well-published source in 360 video and Images where people can't go physically to create in-depth experience of facts.
    4. Built-in Assistant to answer question related to climate change

- **Features: Use Case/Scenario**

Presenting data from well-published source in video and images where image and video are annotated. These annotated images are used to summarize into meaningful information , which is given to user via google home. In future increment we will present in the VR

Approach

- **Data Sources**

  Data Set - Global Warming data

  Data Category - 4 category in Global Warming as Below

  1. Deforestation
  2. Ice sheet melting
  3. Glacier Melting
  4. Sea Level Rise

- **Analytic Tools**

  The analytic tool used is the increment one of the project is **Spark** and **TensorFlow**

- **Analytical Tasks**

  1. This we take dataset from Nasa Climate (https://climate.nasa.gov/system/internal_resources/details/original/647_Global_Temperature_Data_File.txt) and calculated training cost and plotted in Mplot using TensorFlow.
  2. Also created own MINST dataset of global warming dataset and ran Softmax classification.
  3. Created Google classification which interact with Clarifai API for image analysis and image annotation.

- **Expected: Inputs/Outputs**

  Input: Video (mkv format)

  Output: Speech conversation using Google API

- **Algorithms**

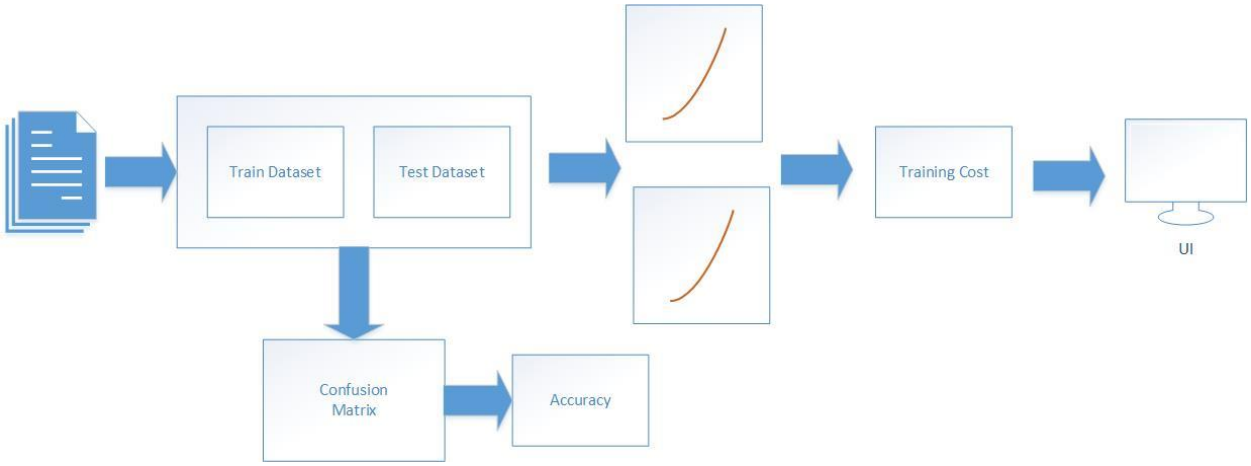
  Random forest model is the algorithm used to train, test and predicate model for our global warming dataset

Related Work

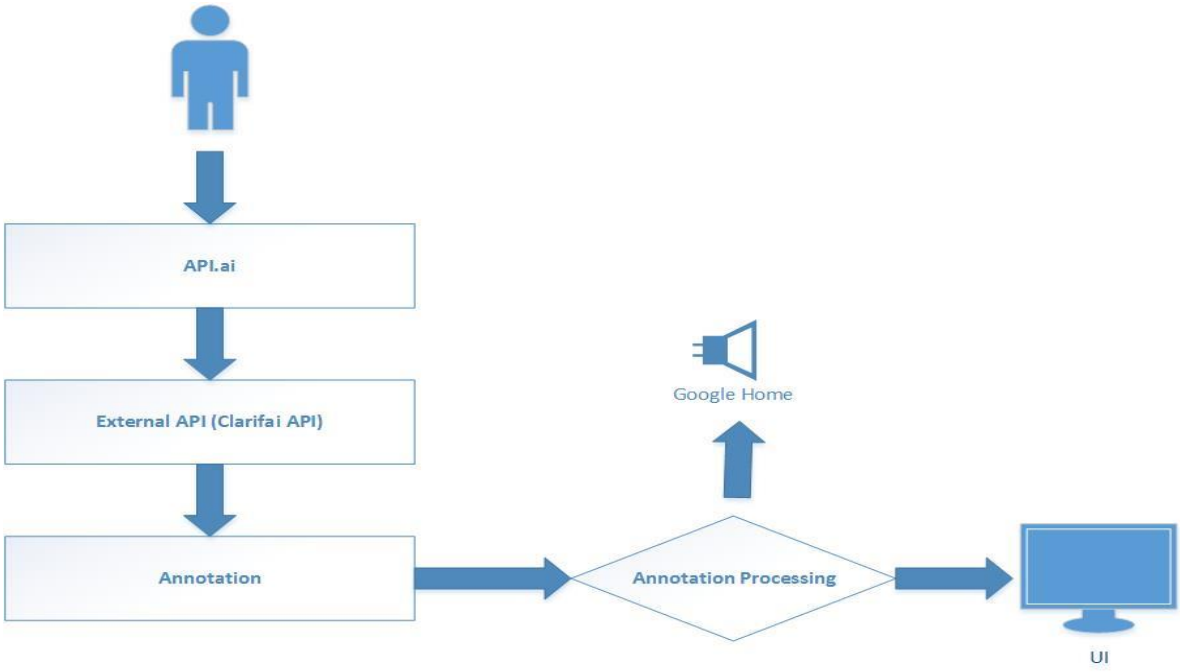
- **Open Source Projects**
  The Scientists Using VR to Tackle Climate Change
  http://thecreatorsproject.vice.com/blog/climate-change-vr-scientists

Application Specification

Software Architecture



Activity Diagram



System Features

- 3D view, 360 spin support
- Detailed description about climate changes based on user preference
- Interactive user interface for user convenience
- Voice assistant support (By training data on climate change facts and information)

Existing Application/Service Used:

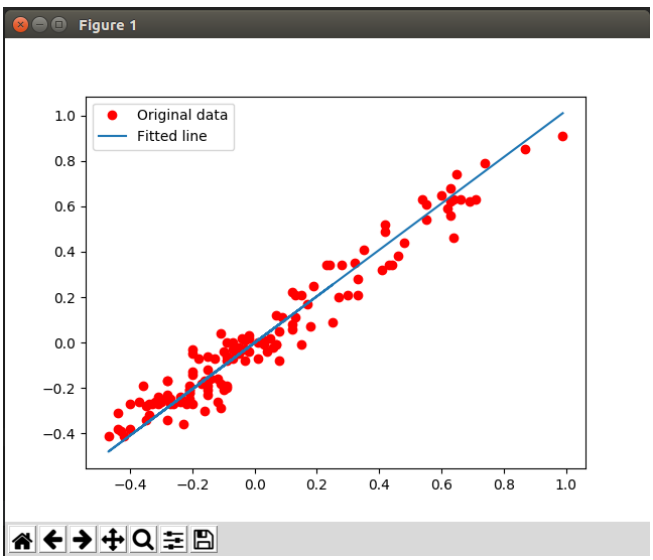
- Service Name: Clarifai
- Service Description: Clarifai automatically tags all your images and video so you can quickly organize, manage, and search through your content.
- Service URL: https://www.clarifai.com/

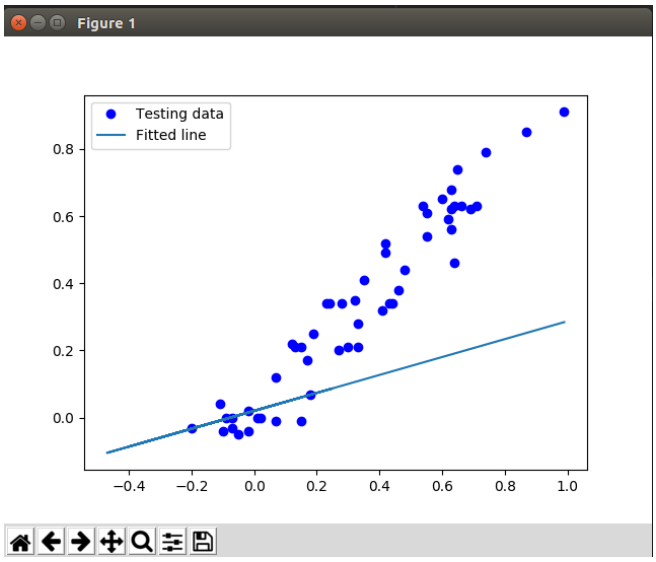
Implementation

First, We took our dataset of global warming dataset from Nasa Climate (https://climate.nasa.gov/system/internal_resources/details/original/647_Global_Temperature_Data_File.txt) and calculated training cost and plotted in mplot using TensorFlow. Also created own MINST dataset of global warming dataset and ran Softmax classification. Created Google classification which interact with Clarifai API for image analysis and image annotation.

Documentation:

TensorFlow Linear Regression:





```
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W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use SSE4.1 instructions, b
W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use SSE4.2 instructions, b
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W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use AVX2 instructions, but
W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use FMA instructions, but
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Epoch: 0100 cost= 0.473084390 W= -1.79415 b= 0.45192
Epoch: 0150 cost= 0.388353199 W= -1.65628 b= 0.301031
Epoch: 0200 cost= 0.335727662 W= -1.52421 b= 0.20818
Epoch: 0250 cost= 0.297095299 W= -1.39815 b= 0.150591
Epoch: 0300 cost= 0.265563369 W= -1.27812 b= 0.114446
Epoch: 0350 cost= 0.238396198 W= -1.16399 b= 0.0913683
Epoch: 0400 cost= 0.214404106 W= -1.05557 b= 0.0762725
Epoch: 0450 cost= 0.192995757 W= -0.952659 b= 0.0660735
Epoch: 0500 cost= 0.173804760 W= -0.854995 b= 0.0588979
Epoch: 0550 cost= 0.156568840 W= -0.762334 b= 0.0536066
Epoch: 0600 cost= 0.141076460 W= -0.674431 b= 0.0495061
Epoch: 0650 cost= 0.127147049 W= -0.591055 b= 0.0461738
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Epoch: 0750 cost= 0.103356592 W= -0.436976 b= 0.0408784
Epoch: 0800 cost= 0.093226098 W= -0.365848 b= 0.0386577
Epoch: 0850 cost= 0.084115289 W= -0.298391 b= 0.0366269
Epoch: 0900 cost= 0.075921483 W= -0.234418 b= 0.0347465
Epoch: 0950 cost= 0.068552427 W= -0.173748 b= 0.032991
Epoch: 1000 cost= 0.061925095 W= -0.116213 b= 0.0313429
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```
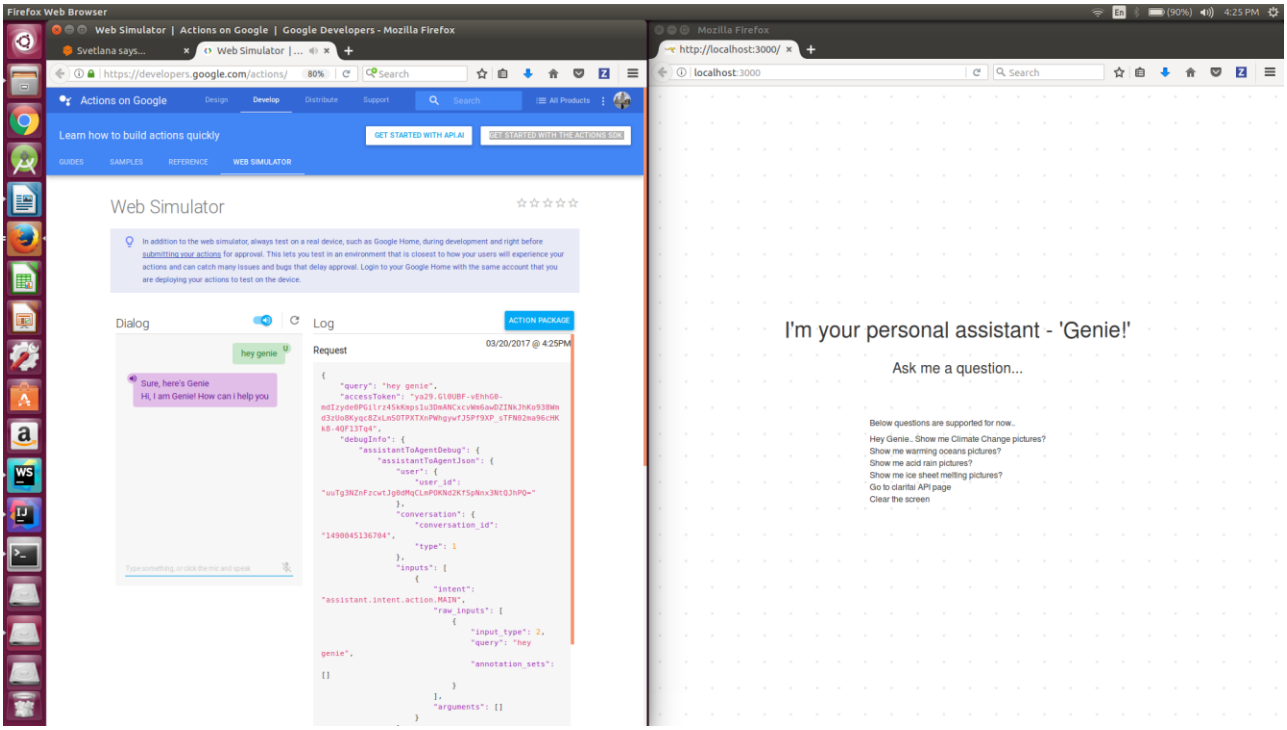
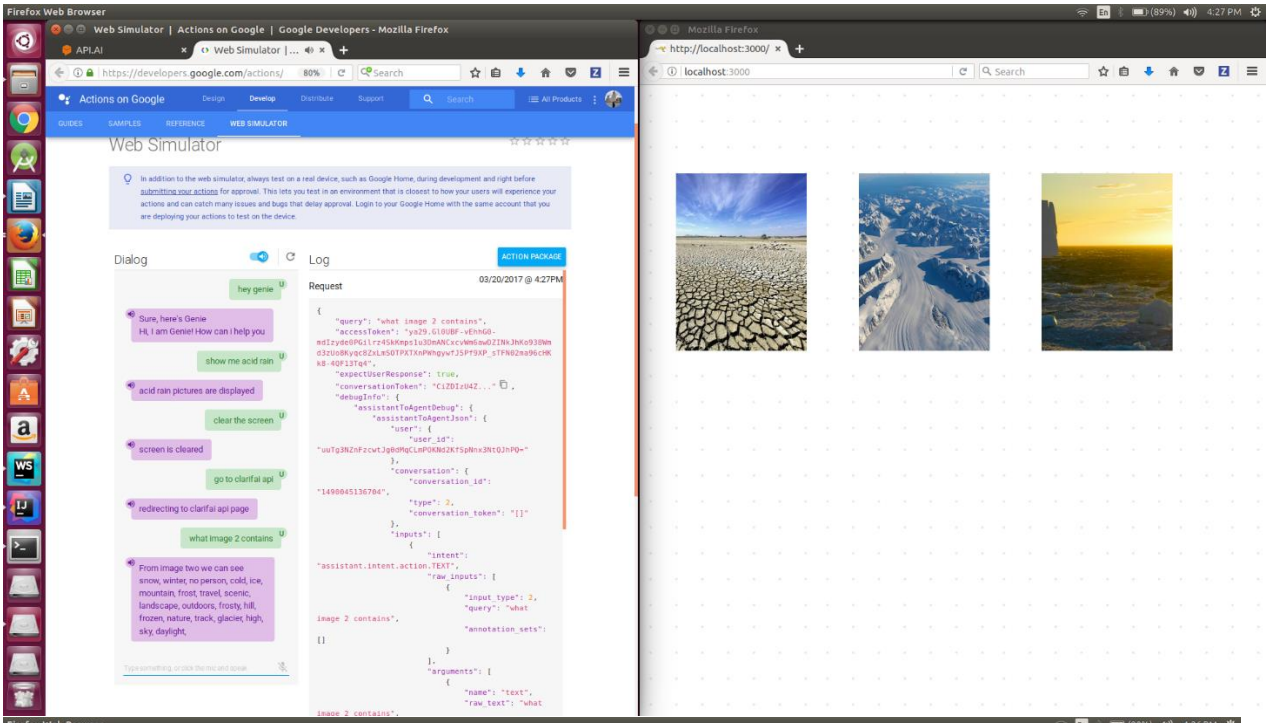
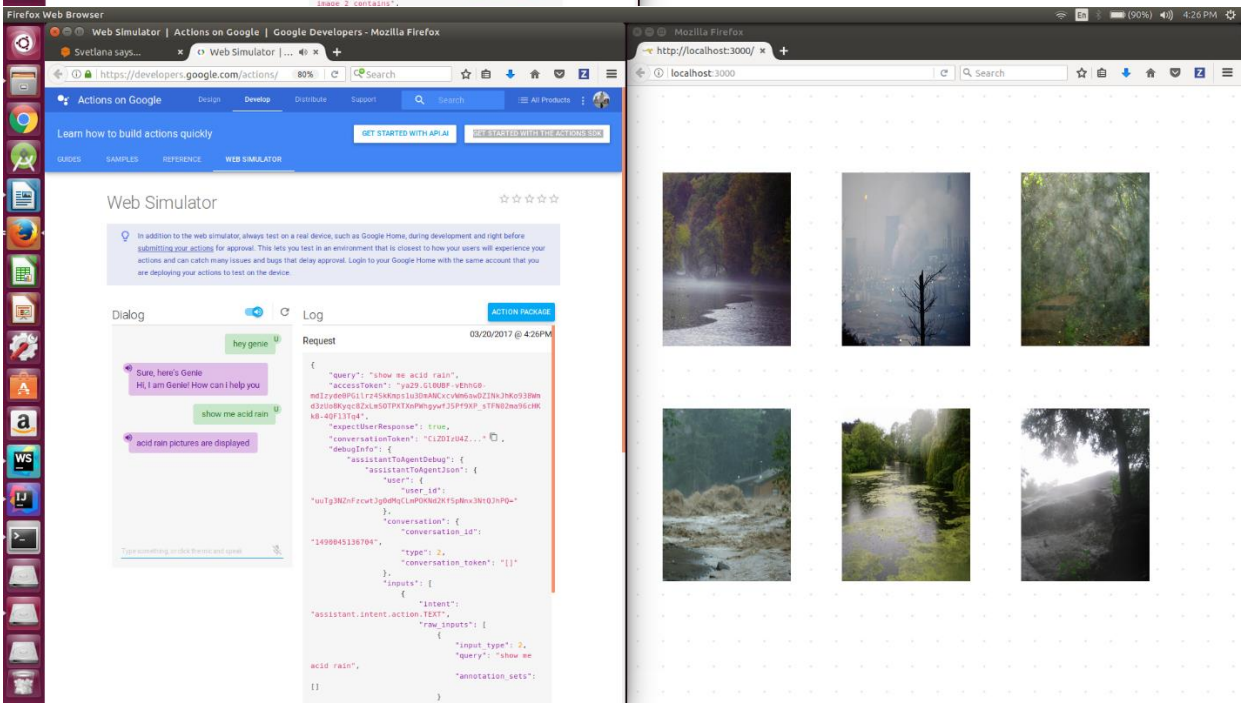
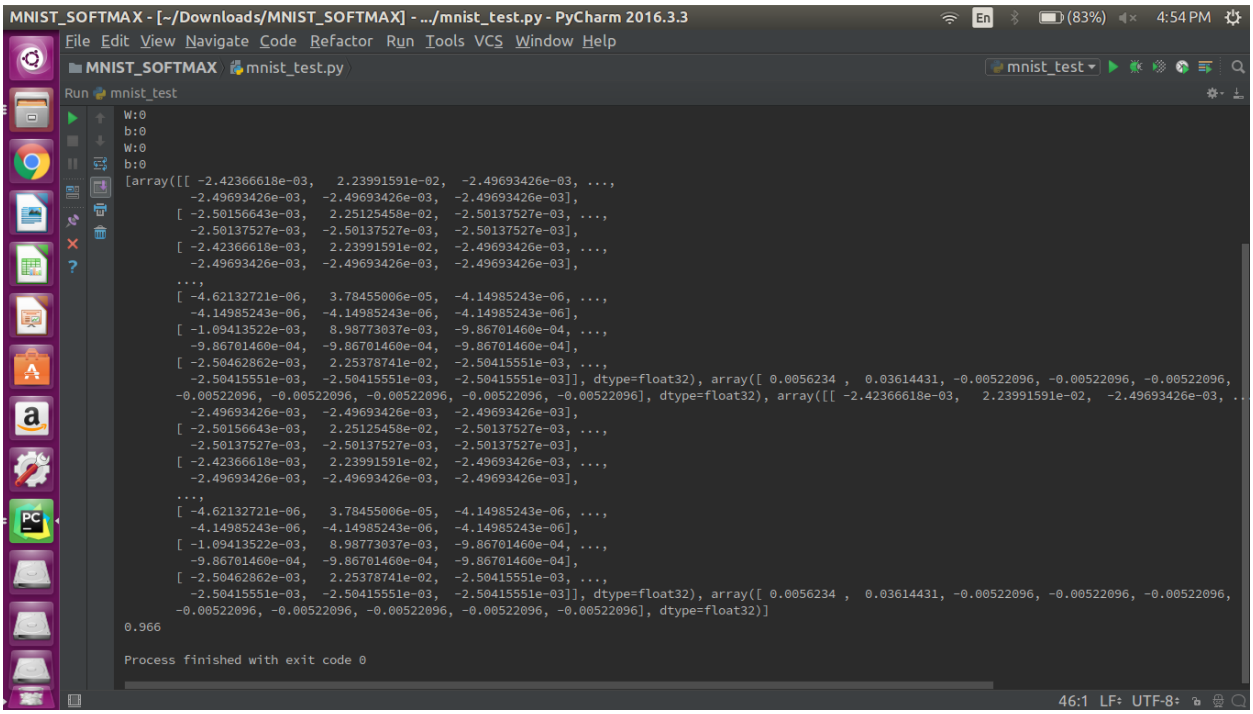

Google Conversations API :




Firefox Web Browser
Web Simulator | Actions on Google | Google Developers - Mozilla Firefox
Mozilla Firefox
Actions on Google
Web Simulator
Dialog
Log
hey genie
Sure, here's Genie
Hi, I am Genie! How can i help you
show me acid rain
acid rain pictures are displayed
clear the screen
screen is cleared
go to clarifai api
redirecting to clarifai api page
what image 2 contains
From image two we can see snow, winter, no person, cold, ice, mountain, frost, travel, scenic, landscape, outdoors, frosty, hill, frozen, nature, track, glacier, high, sky, daylight,
Request
03/20/2017 @ 4:27PM
http://localhost:3000/
localhost:3000


Firefox Web Browser
Web Simulator | Actions on Google | Google Developers - Mozilla Firefox
Mozilla Firefox
Actions on Google
Learn how to build actions quickly
Web Simulator
Dialog
Log
hey genie
Sure, here's Genie
Hi, I am Genie! How can i help you
show me acid rain
acid rain pictures are displayed
Request
03/20/2017 @ 4:26PM
http://localhost:3000/
localhost:3000

SoftMax:


MNIST_SOFTMAX - [~/Downloads/MNIST_SOFTMAX] - .../mnist_test.py - PyCharm 2016.3.3
File Edit View Navigate Code Refactor Run Tools VCS Window Help
MNIST_SOFTMAX mnist_test.py
Run mnist_test
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b:0
W:0
b:0
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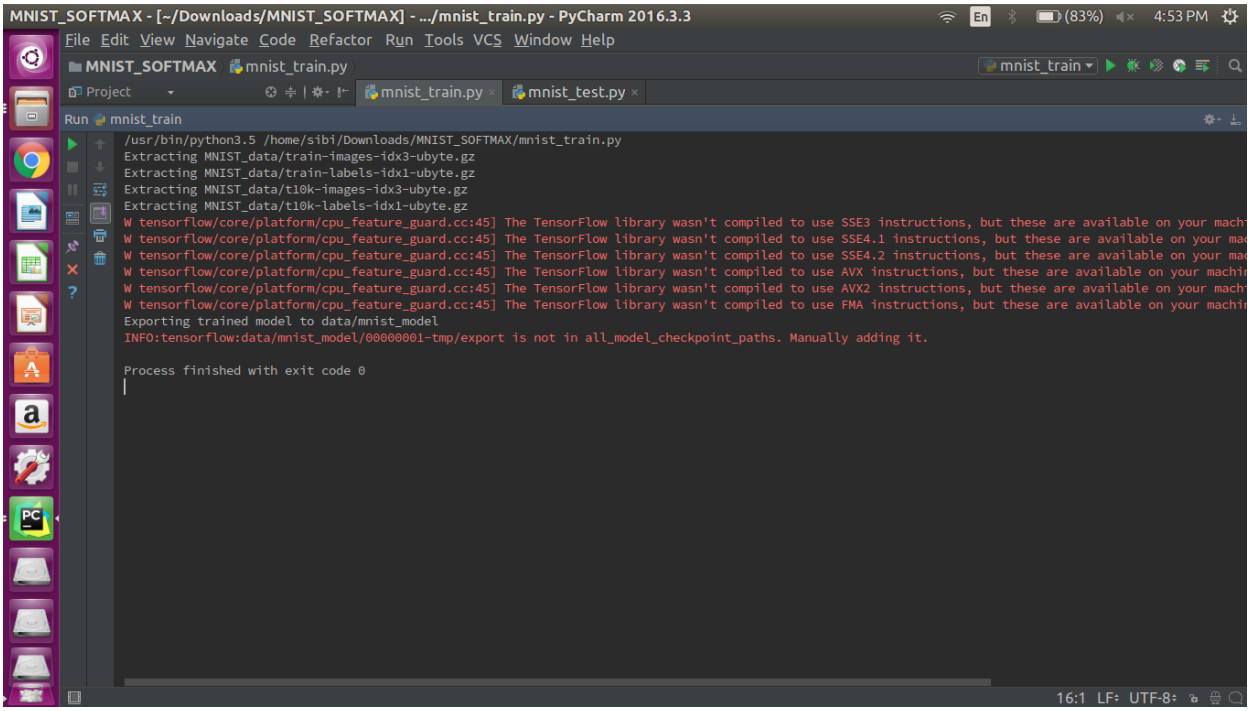
MNIST_SOFTMAX - [~/Downloads/MNIST_SOFTMAX] - .../mnist_train.py - PyCharm 2016.3.3
File Edit View Navigate Code Refactor Run Tools VCS Window Help
MNIST_SOFTMAX mnist_train.py
mnist_train
Project
mnist_train.py
mnist_test.py
Run mnist_train
/usr/bin/python3.5 /home/sibi/Downloads/MNIST_SOFTMAX/mnist_train.py
Extracting MNIST_data/train-images-idx3-ubyte.gz
Extracting MNIST_data/train-labels-idx1-ubyte.gz
Extracting MNIST_data/t10k-images-idx3-ubyte.gz
Extracting MNIST_data/t10k-labels-idx1-ubyte.gz
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W tensorflow/core/platform/cpu_feature_guard.cc:45] The TensorFlow library wasn't compiled to use FMA instructions, but these are available on your machi
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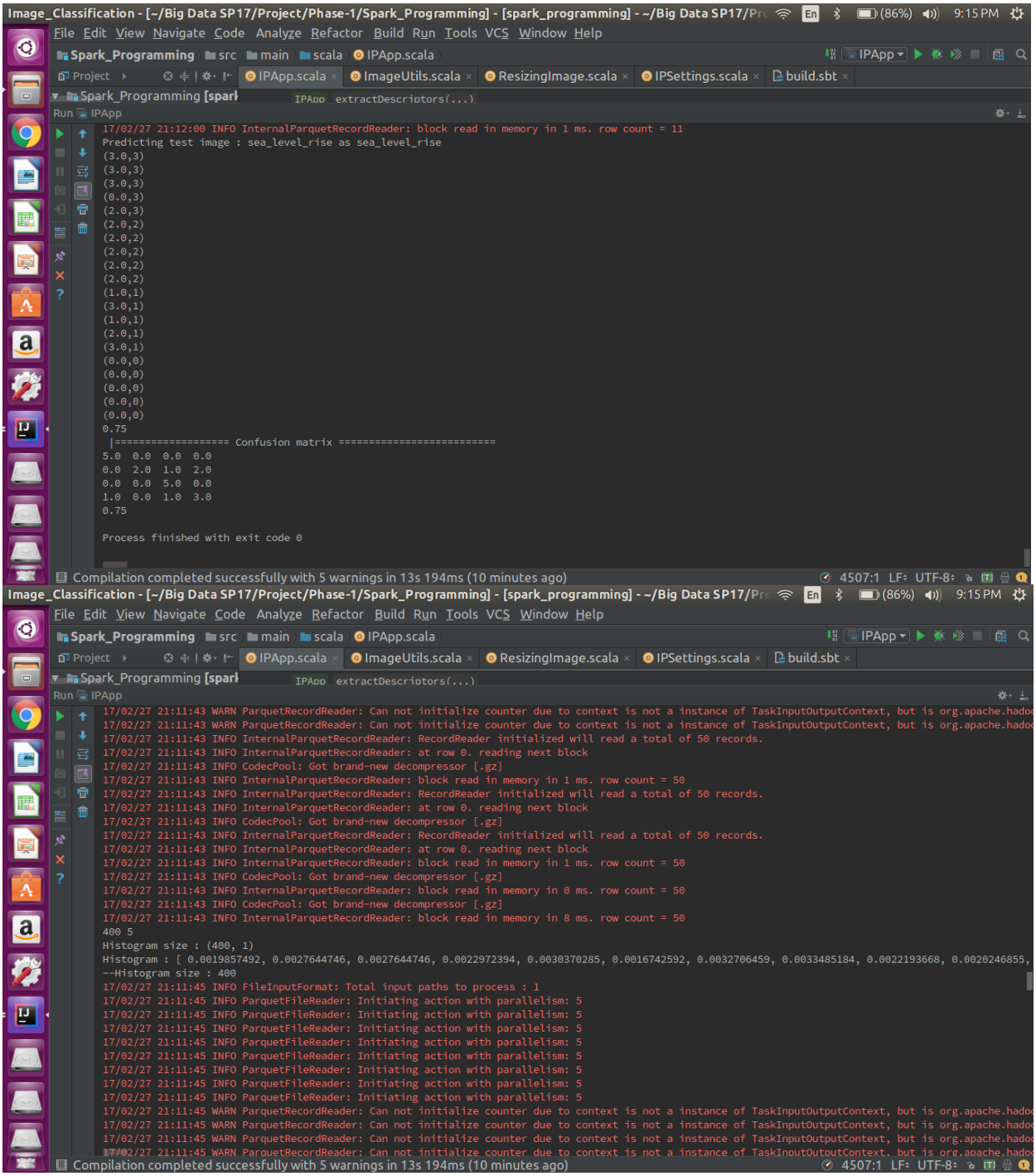
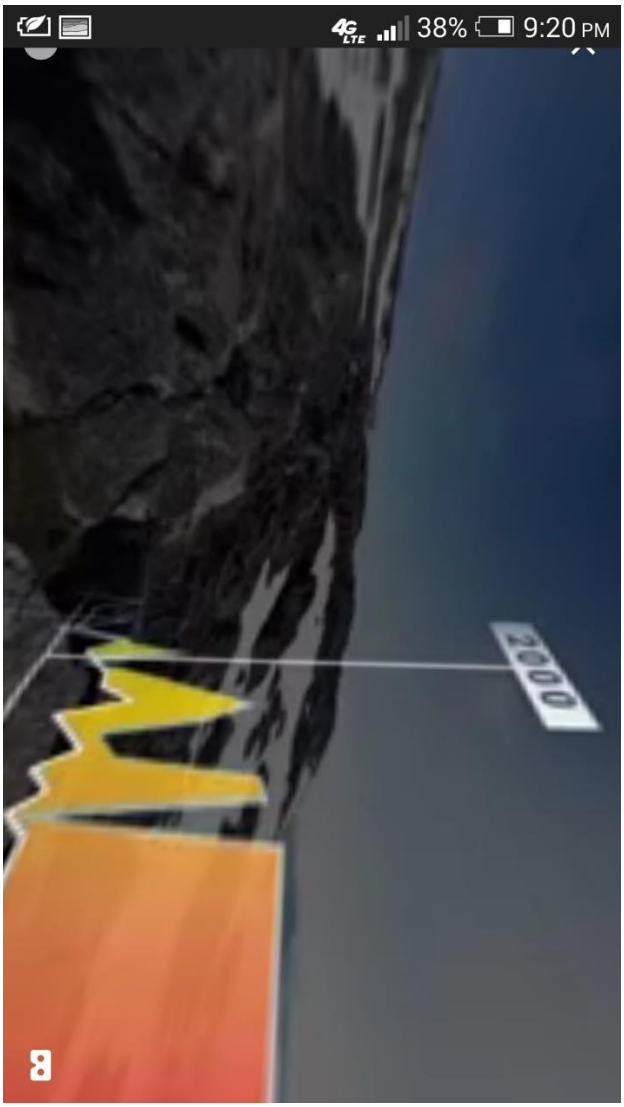
16:1 LF: UTF-8:

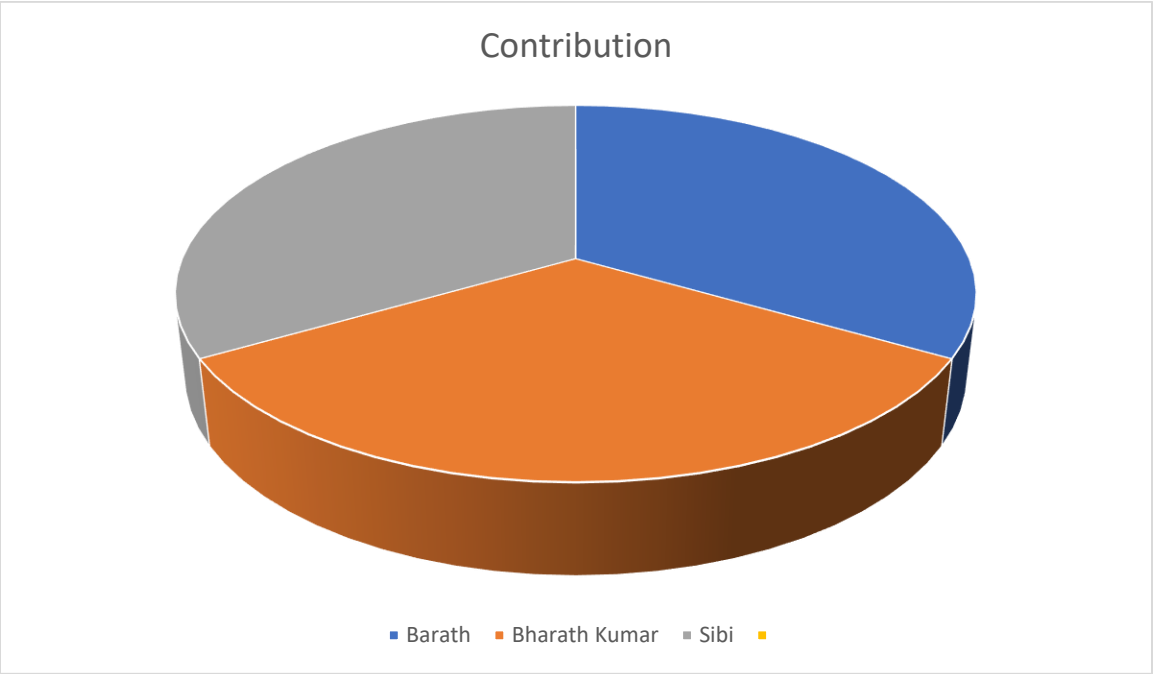
Shallow Learning – Spark – Video Classification



Android VR



Project Management



Contribution in Project:

Naravula Loganathan,Barath – 28

- Documentation
- TensorFlow Linear Regression
- VR Google Cardboard Application

Natesan Arumugam,Bharath Kumar – 29

- Google Conversation API
- Implementation of clarifai API

Ramesh,Sibi Chakravarthy – 34

- SoftMax
- Image Classification using Apache Spark