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 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. Soil Acidification
  3. Glacier Melting
  4. Sea Level Rise

- **Analytic Tools**

  The analytic tool used is the increment one of the project is **TensorFlow – Retrain Inception Final Layer**

- **Analytical Tasks**

  1. This we take dataset from ImageNet (http://www.image-net.org/) and calculated training cost using TensorFlow.
  2. Created Google conversation which interact with image analysis and image annotation.

- **Expected: Inputs/Outputs**

  Input: Video (mkv format)
  Output: Speech conversation using Google API

- **Algorithms**

  Retrain Inception Final Layer is the algorithm used to train, test and predicate model for our climate change dataset.

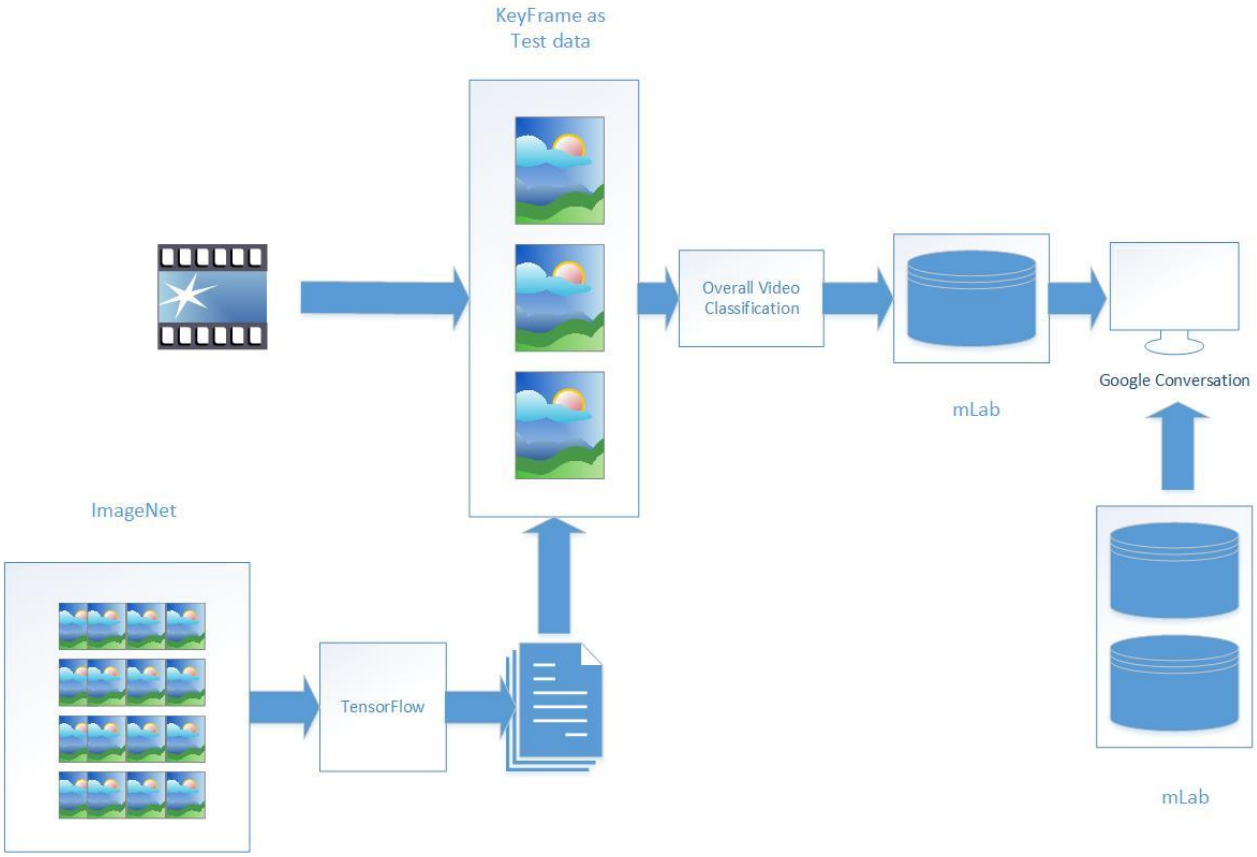
Related Work

- **Open Source Projects**

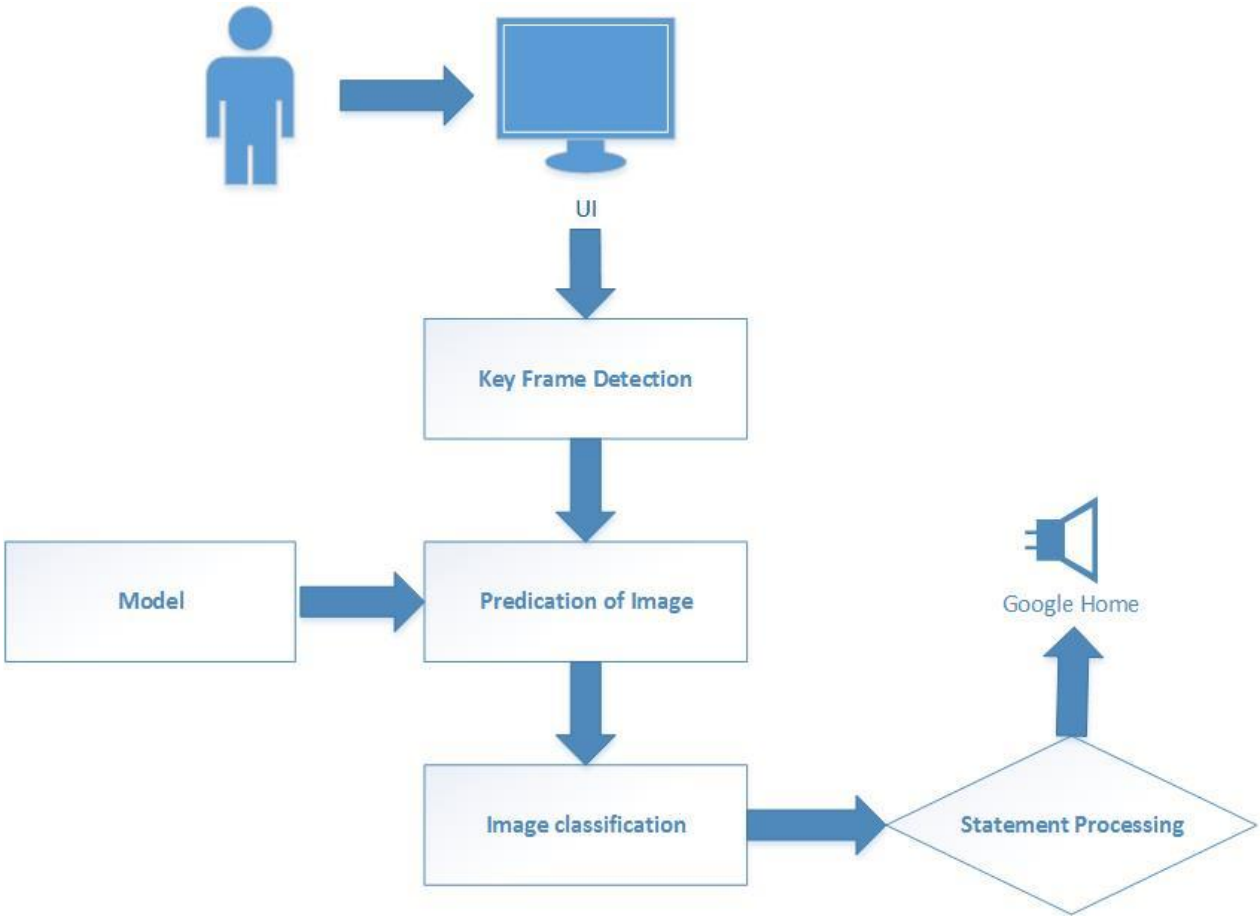
  The Scientists Using VR to Tackle Climate Change
  http://thecreatorsproject.vice.com/blog/climate-change-vr-scientists

Application Specification

Software Architecture



Activity Diagram



System Features

- User interface supported with video player.
- 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:

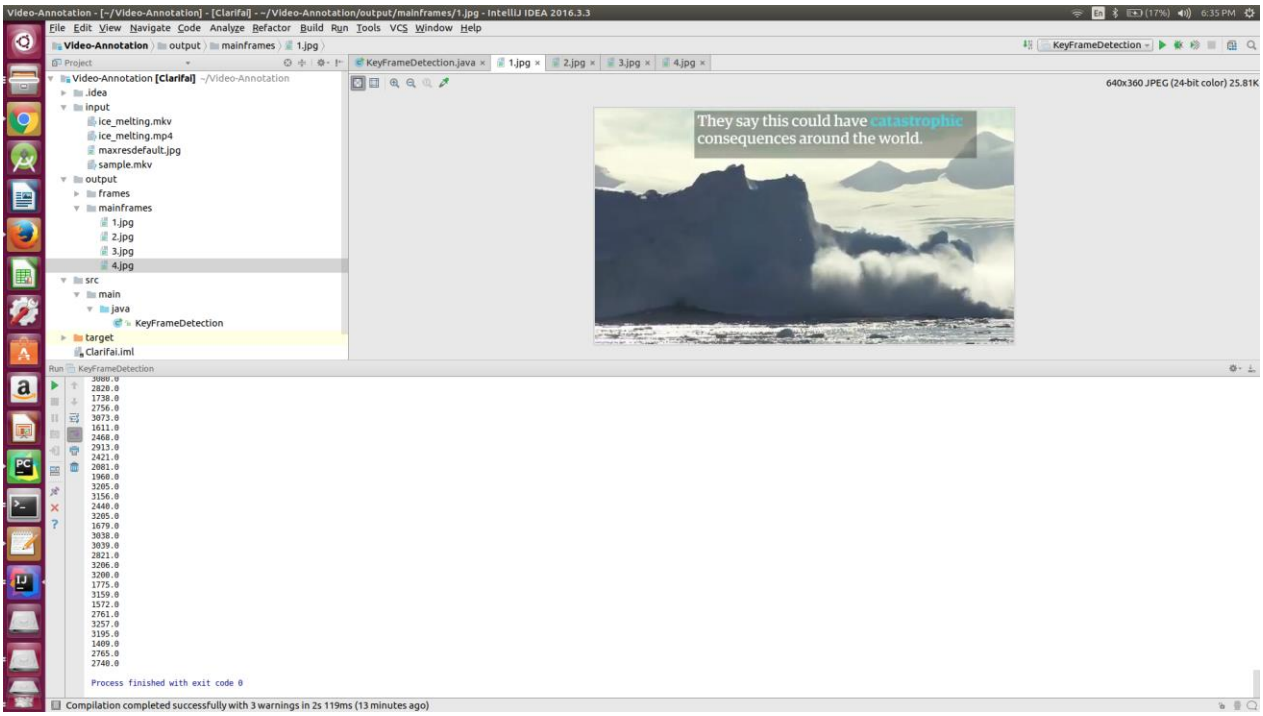
- Service Name: OpenIMAG
- Service Description: OpenIMAJ is set of libraries and tools used to extract main keyframes from video.
- Service URL: http://openimaj.org/

Implementation

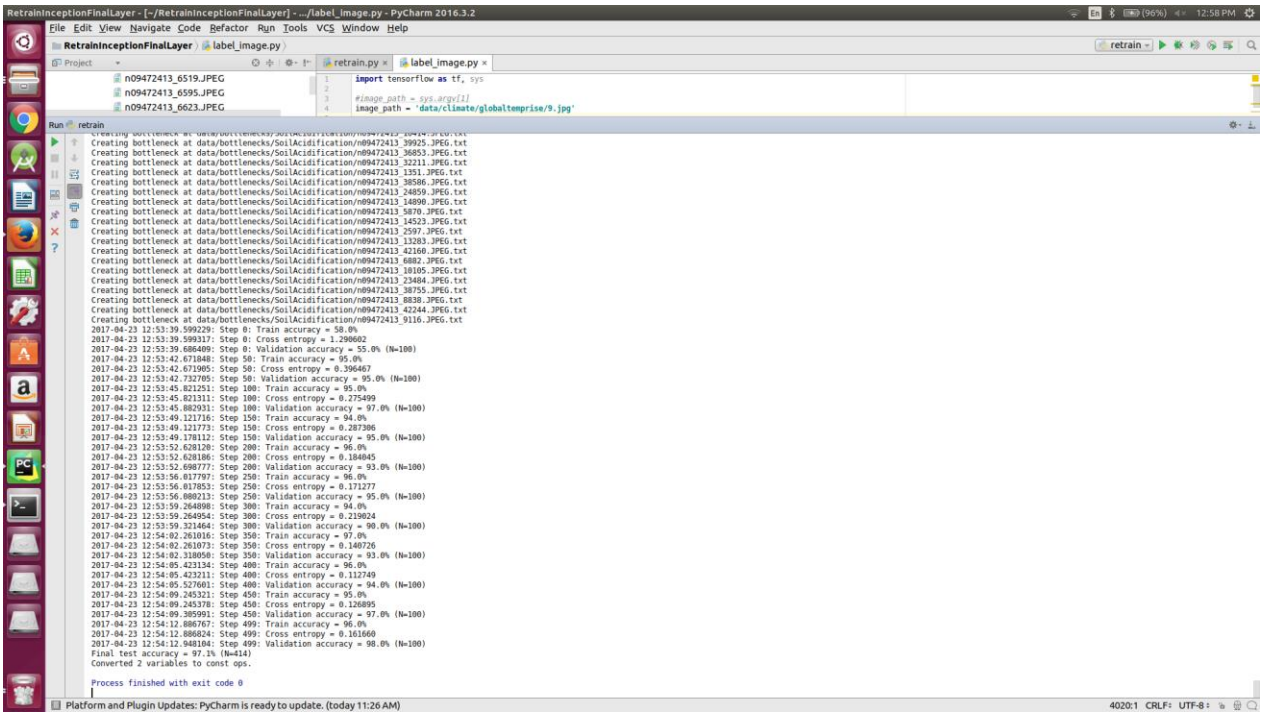
- First, we take climate change dataset from Image net and we train our model using Retrain Inception Final Layer model in Tensor Flow.
- Then we upload video in user interface and we extract mainframes from using image annotation tools such as Open IMAG.
- These collected mainframes are passed as test data to our trained model and image classification using softmax regression and the results are stored in Mlab database.
- For user convenience, we implemented Google Conversation API using api.ai and created intents according to our theme.
- In simulation when these intents are triggered we fetch the desired results from mlab database which is deployed in Heroku-cloud application

Documentation:

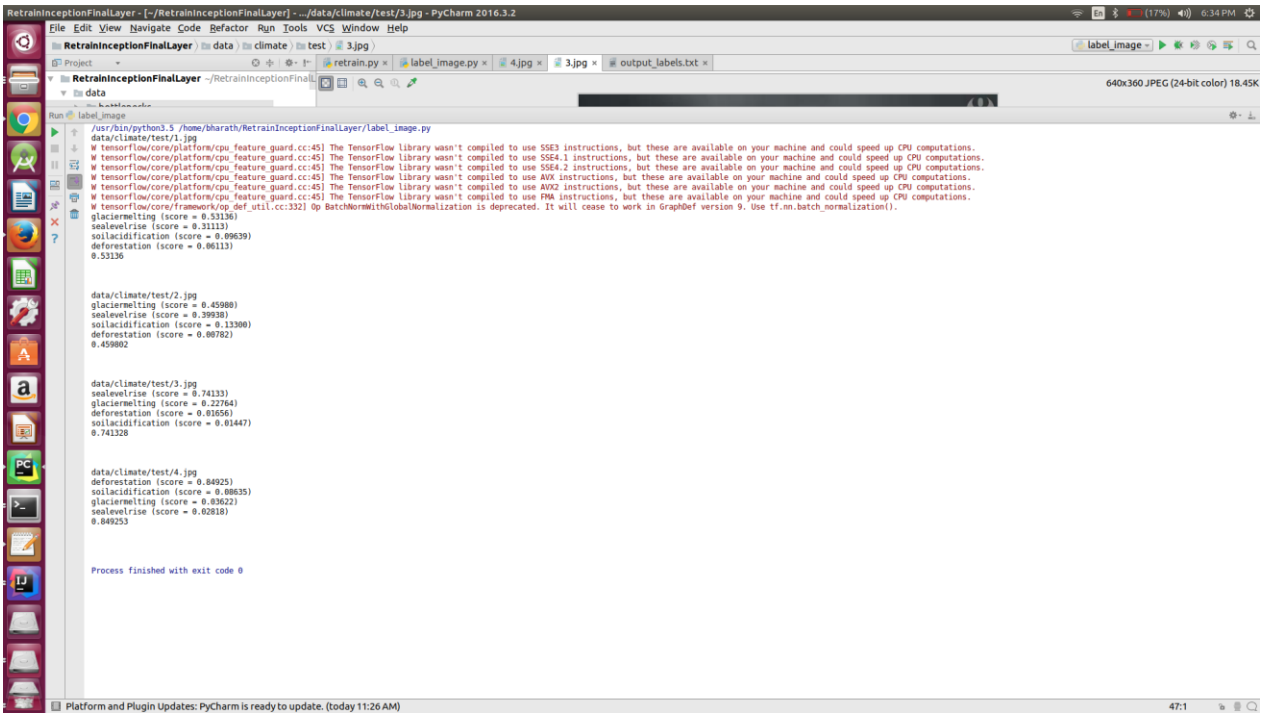
Video Annotation



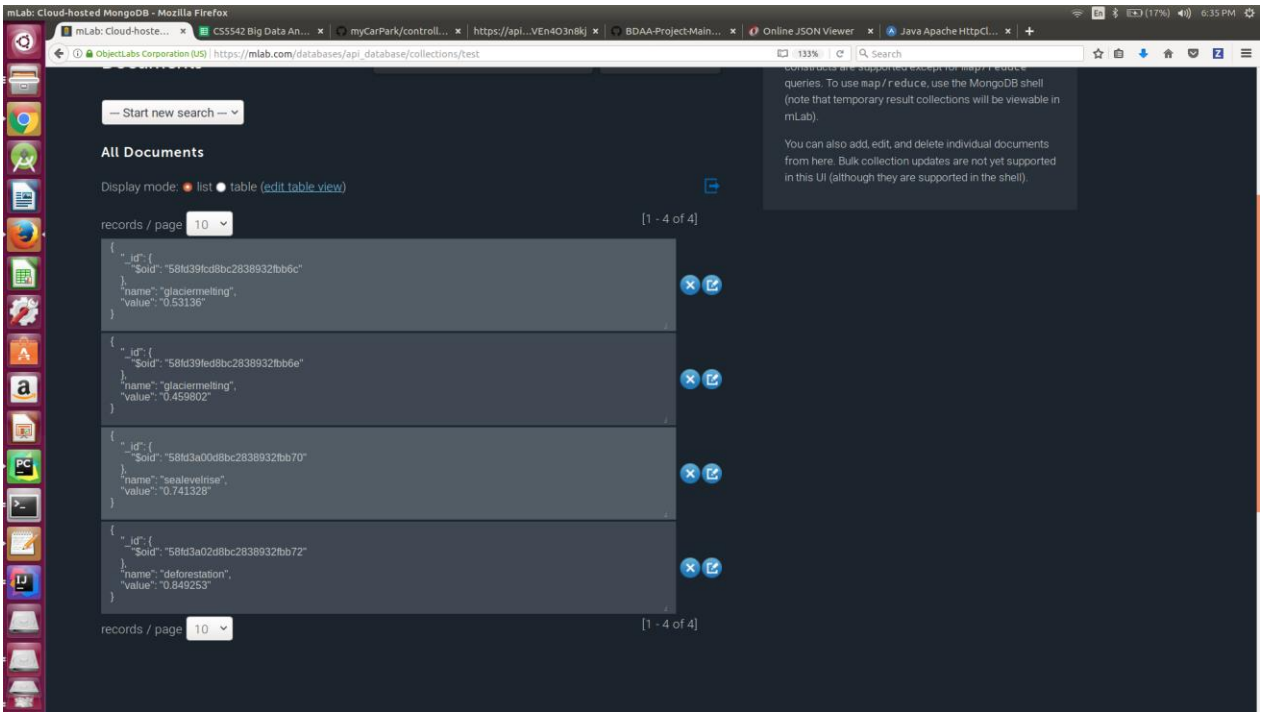
Tensor Flow – Training



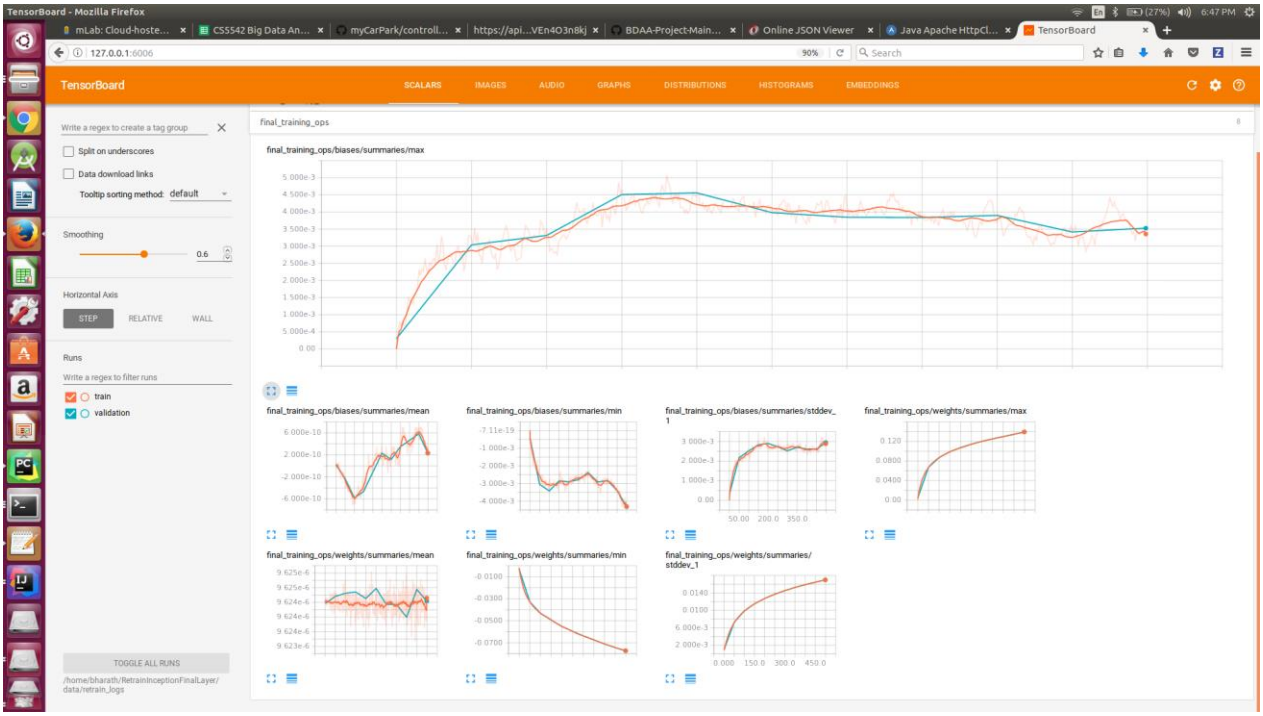
Tensor Flow – Testing

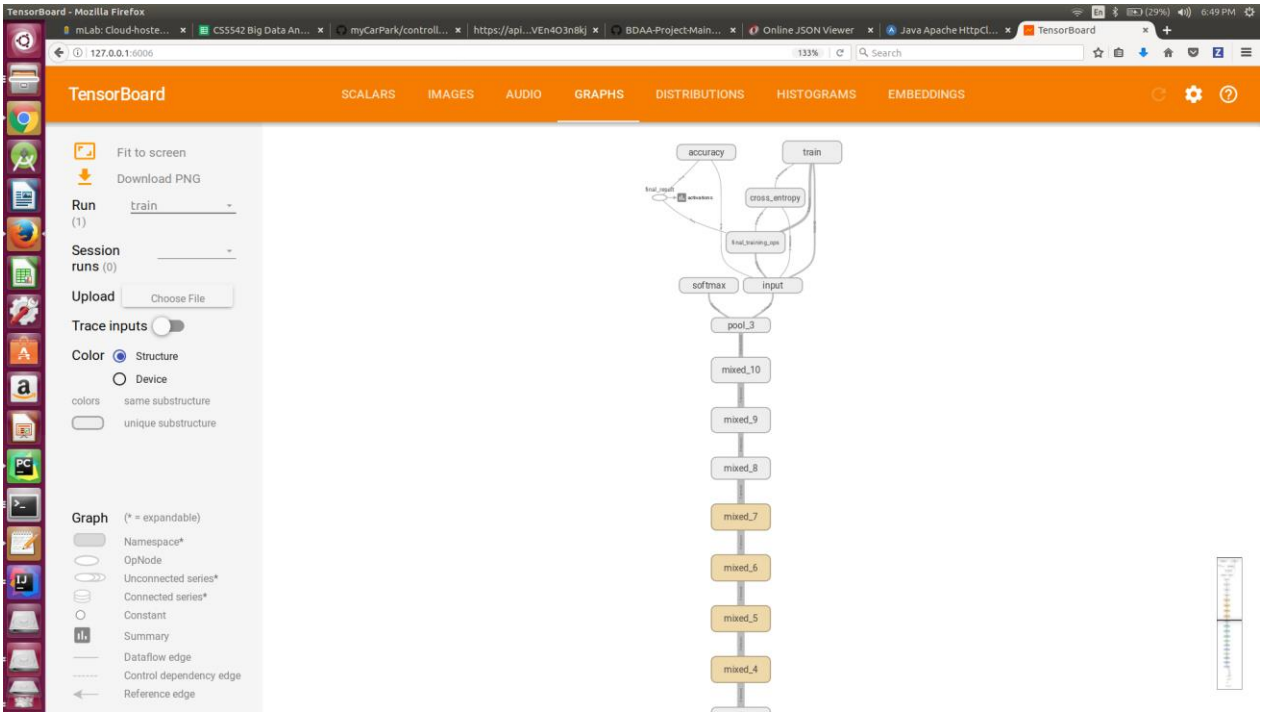


Database



Tensor Board




TensorBoard - Mozilla Firefox
TensorBoard
SCALARS
IMAGES
AUDIO
GRAPHS
DISTRIBUTIONS
HISTOGRAMS
EMBEDDINGS
Fit to screen
Download PNG
Run
train
Session runs (0)
Upload
Choose File
Trace inputs
Color
Structure
Device
colors
same substructure
unique substructure
Graph
(* = expandable)
Namespace*
OpNode
Unconnected series*
Connected series*
Constant
Summary
Dataflow edge
Control dependency edge
Reference edge
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mixed_6
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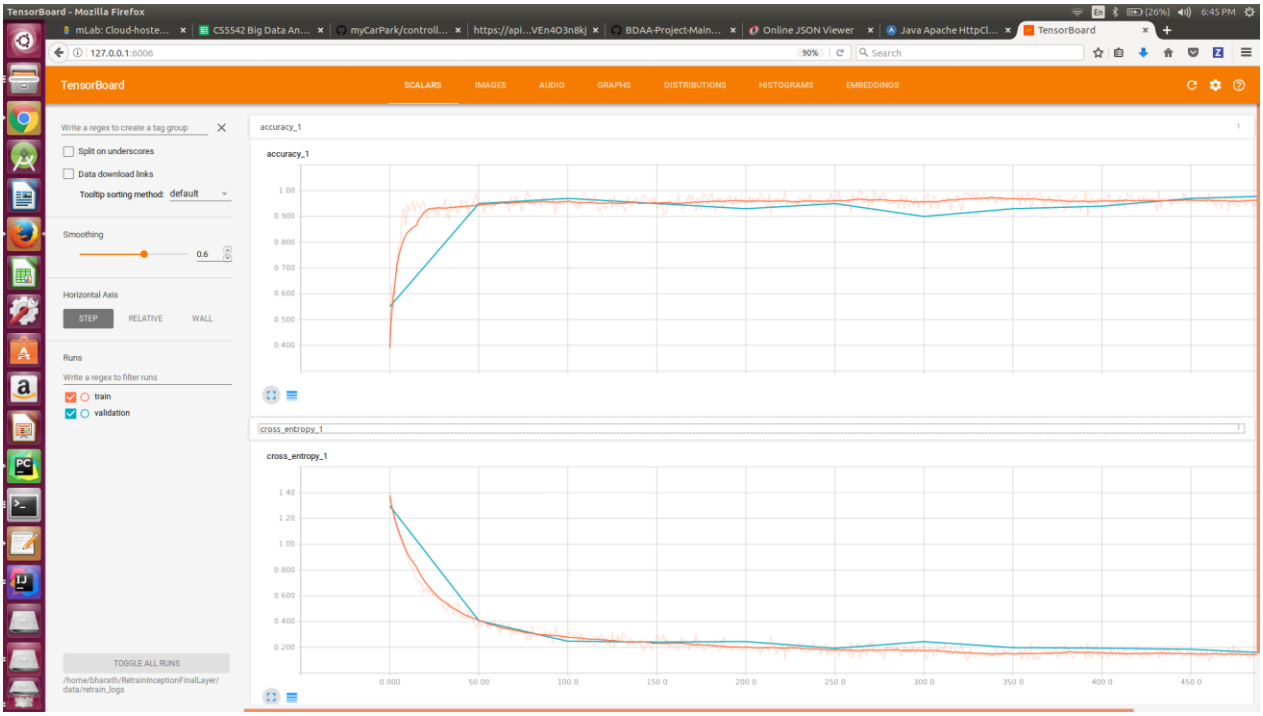
mixed_4


TensorBoard - Mozilla Firefox
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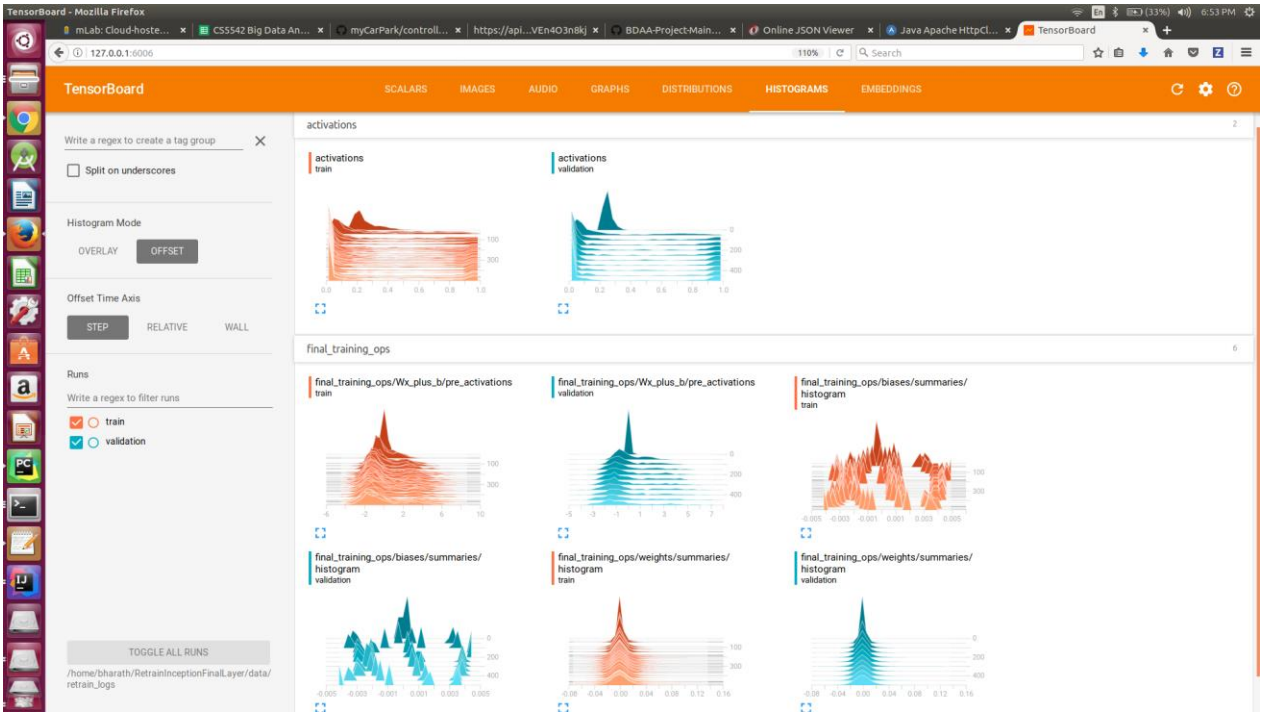
cross_entropy_1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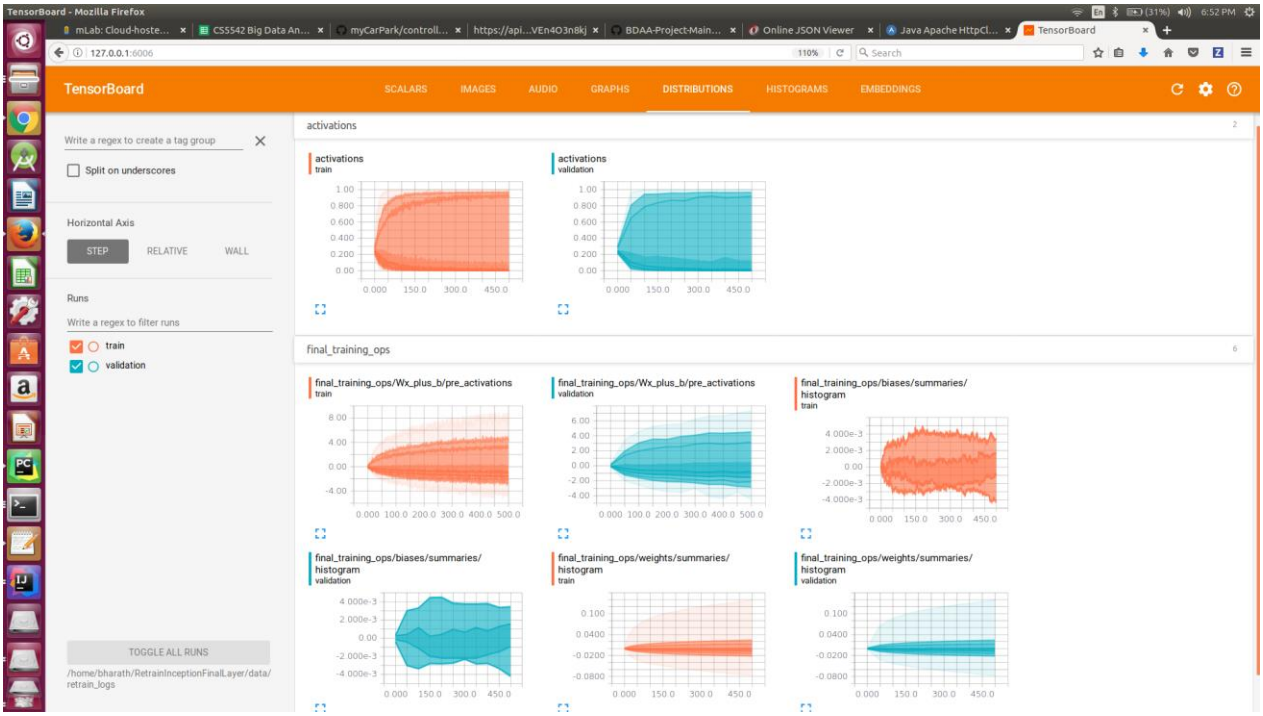
train
final_training_ops/weights/summaries/histogram
validation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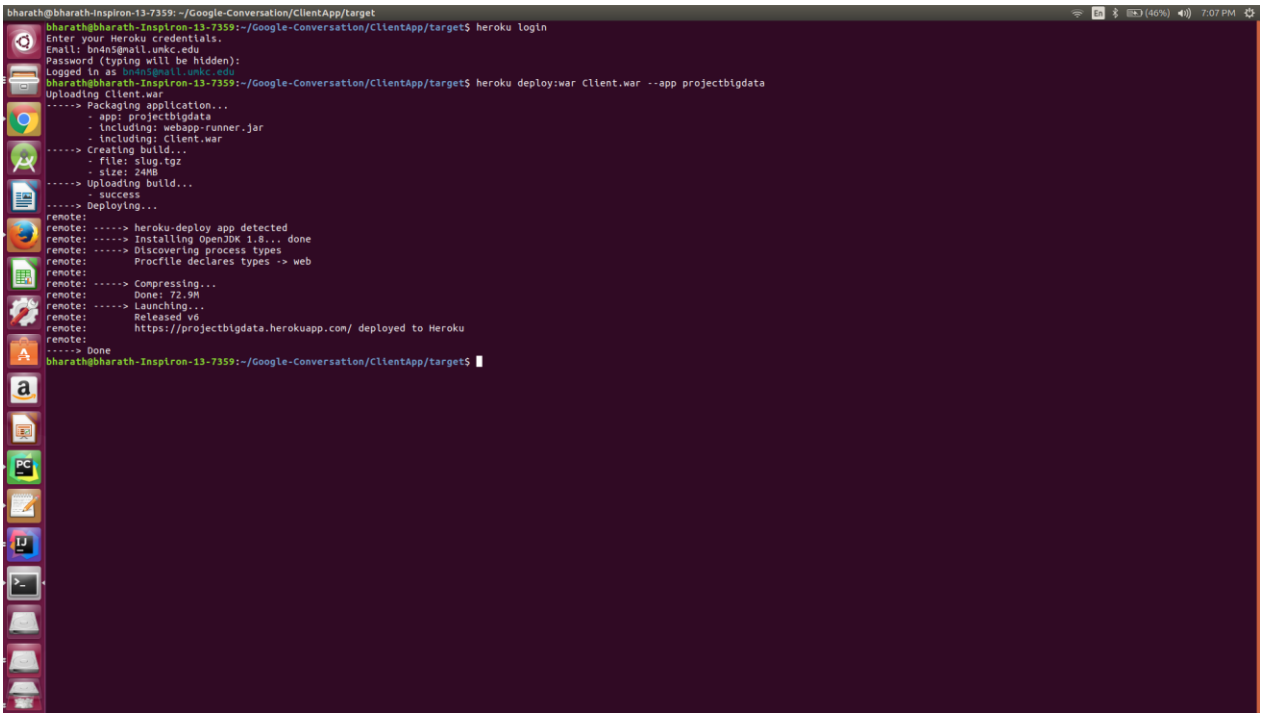
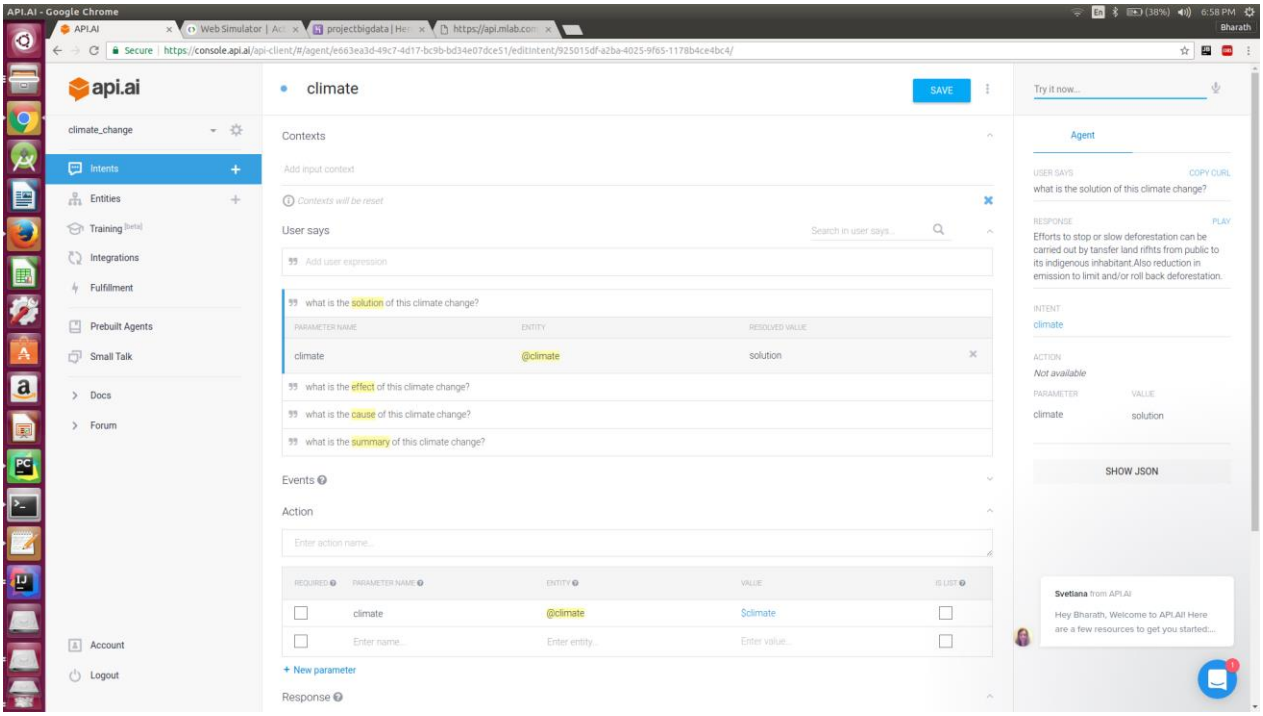
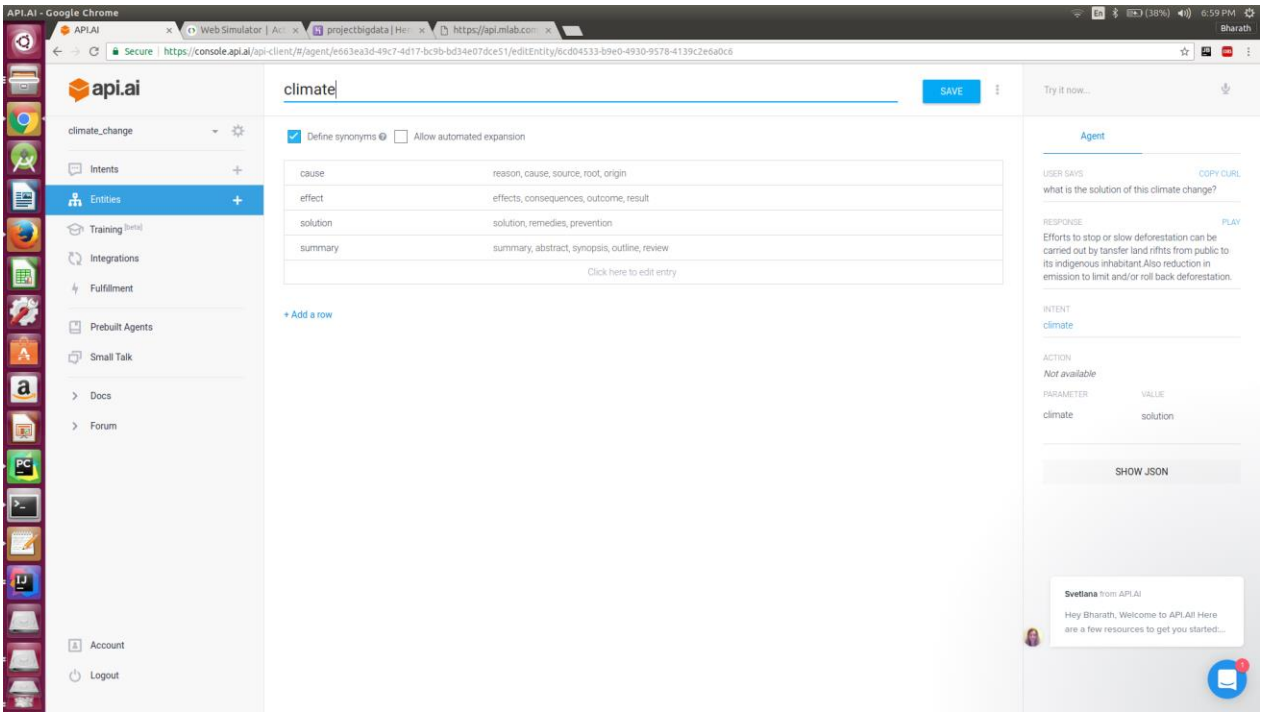
train
final_training_ops/weights/summaries/histogram
validation

Google Conversation – Heroku Deployment

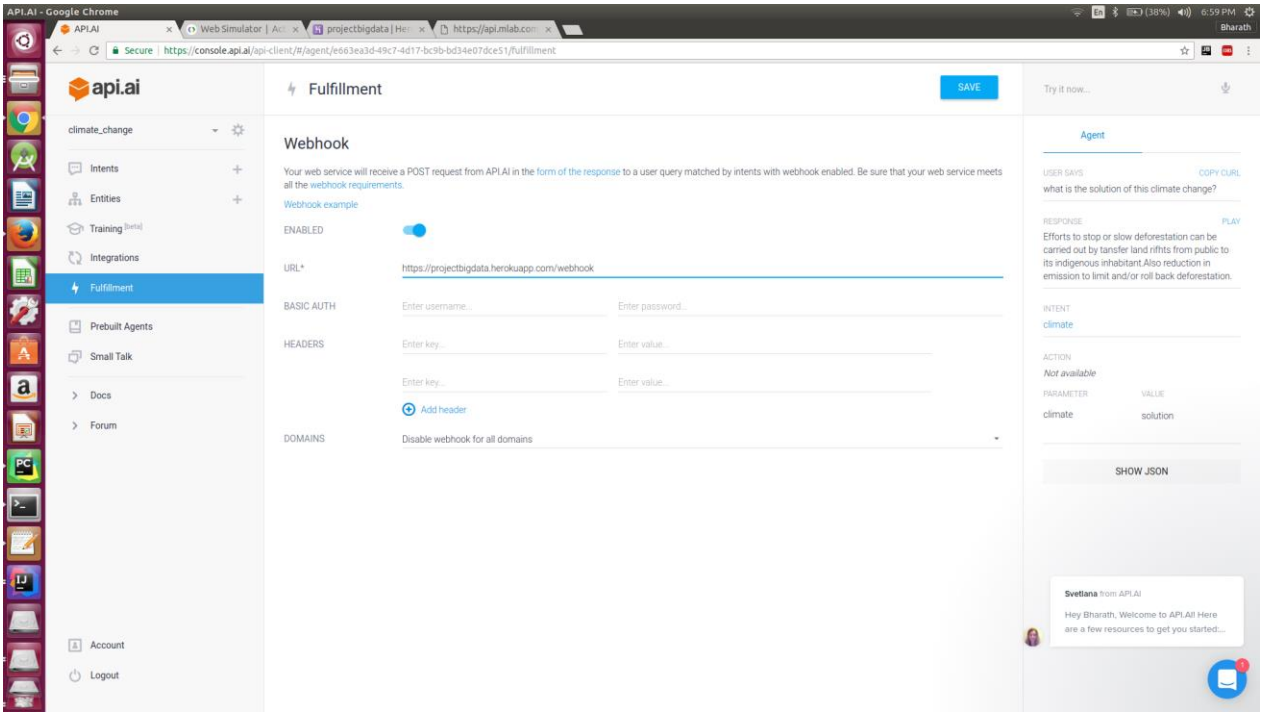


Google Conversation – Api.ai

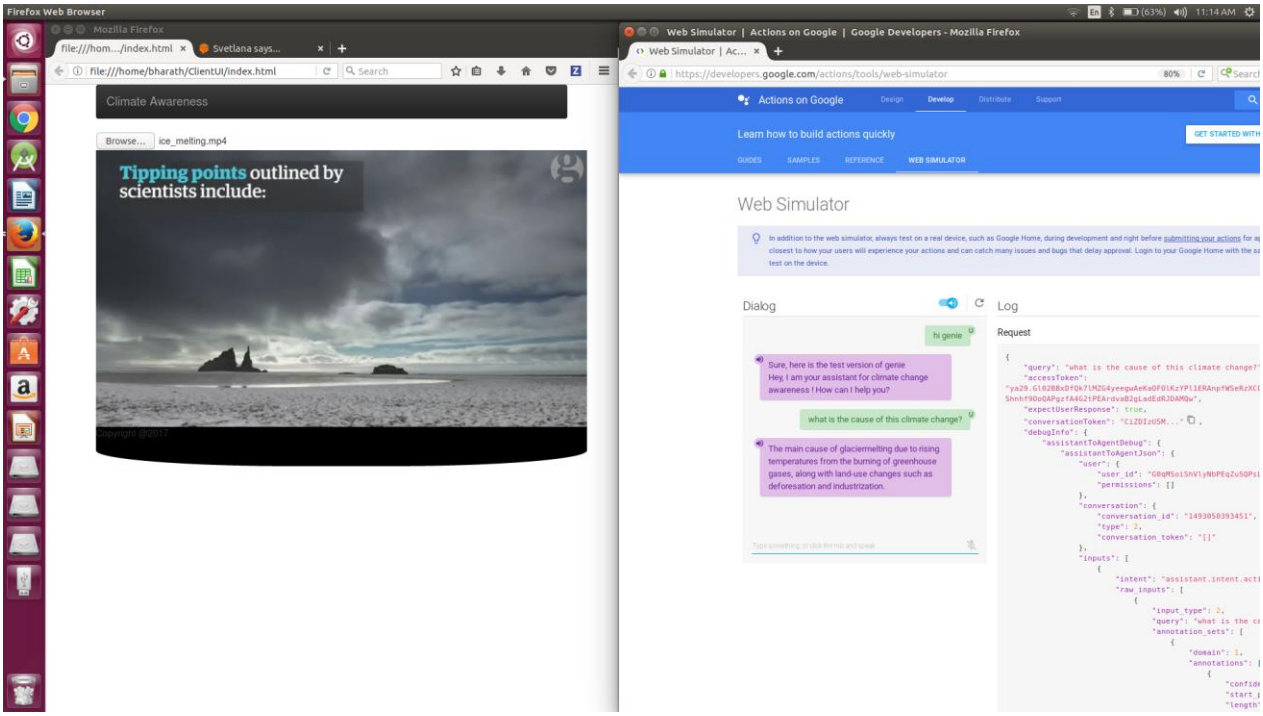




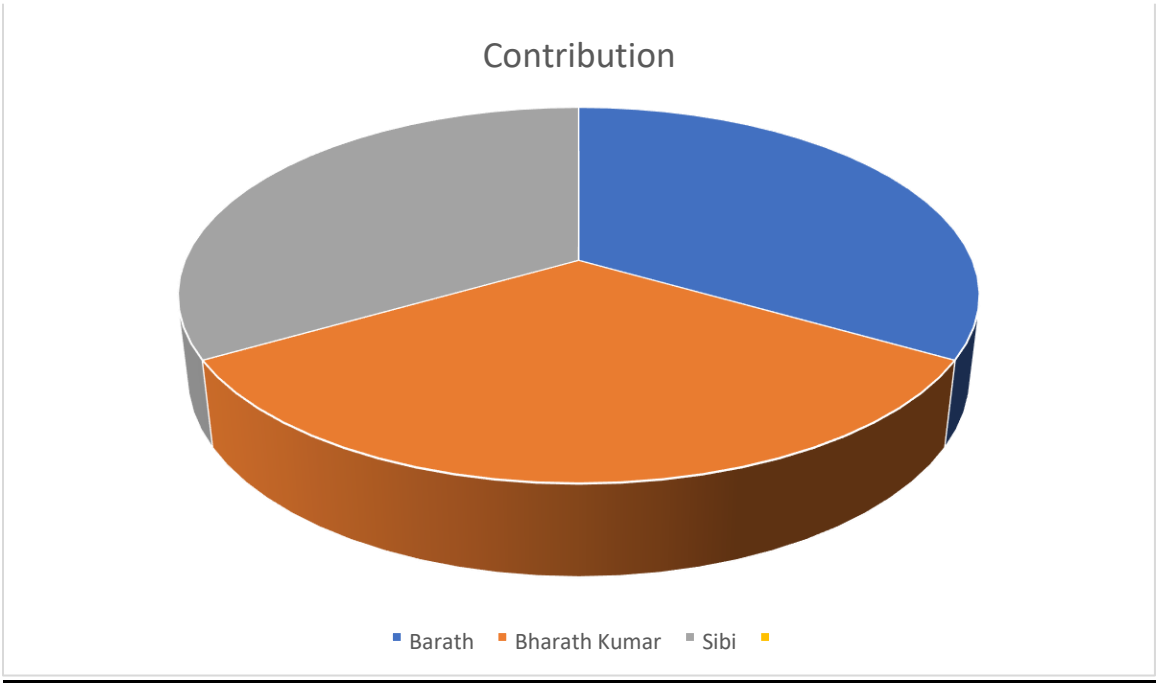
Google Conversation – Webhook



Home Page



Project Management



Contribution in Project:

Naravula Loganathan,Barath – 28

- Documentation
- Google Conversation API

Natesan Arumugam,Bharath Kumar – 29

- Tensor Flow Training Model
- Database Schema – Mlab

Ramesh,Sibi Chakravarthy – 34

- User Interface
- Key Frame Detection