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 **Clarifai**

- **Analytical Tasks**

We took our dataset of global warming in form of video(.mkv format) and then determined the keyframe in the video, later we passed the key frame to the Clarifai API. Clarifai API find the objects in the image and annotated objects according from higher to lower confidence score. We summaries the all the image object along with confidence score by pushing the data to MongoDB and then deploying into google home via Heroku to form meaningful summarized sentence.

Also, We have classified all our global warming data set and then trained model to predict the test data set in Client UI using Random forest model.

- **Expected: Inputs/Outputs**

Input: Video (mkv format)

Output: Speech conversation using Google API

- **Algorithms**

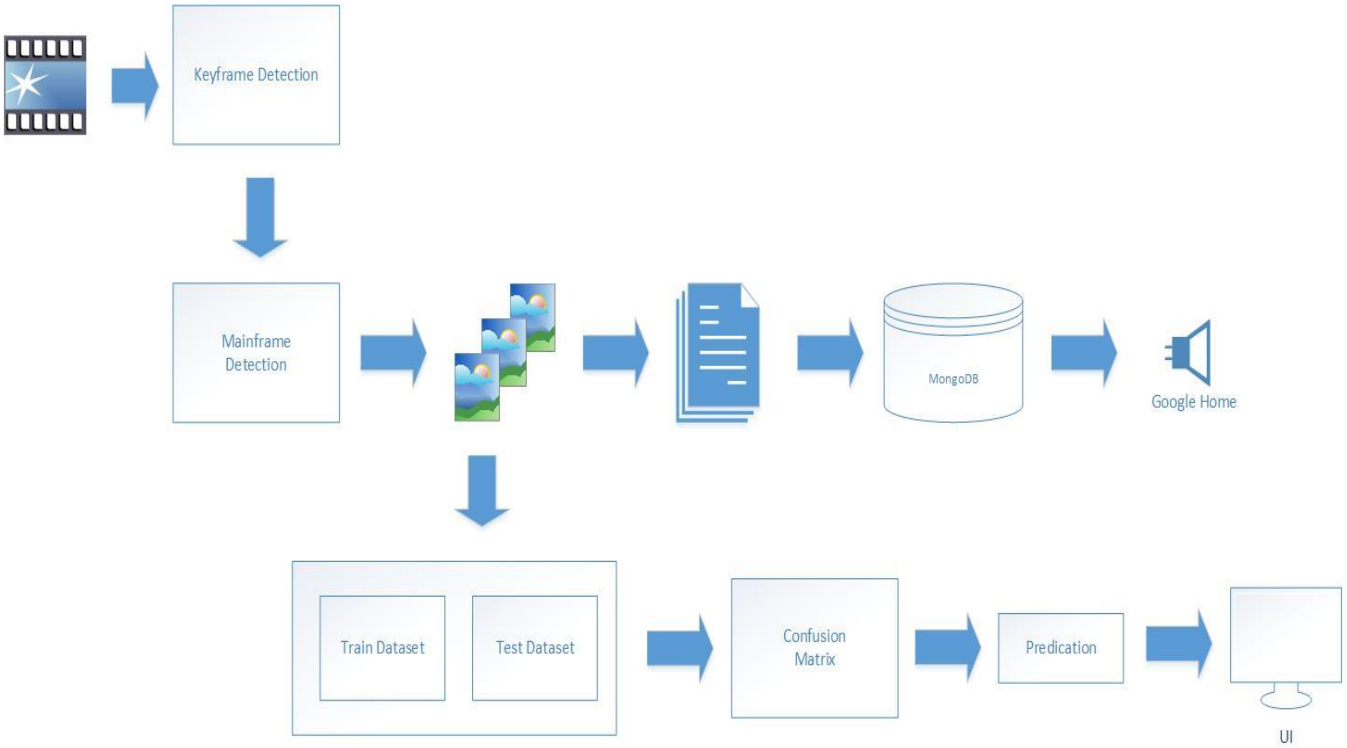
Random forest model is the algorithm used to train, test and predicate model for our global warming dataset

Related Work

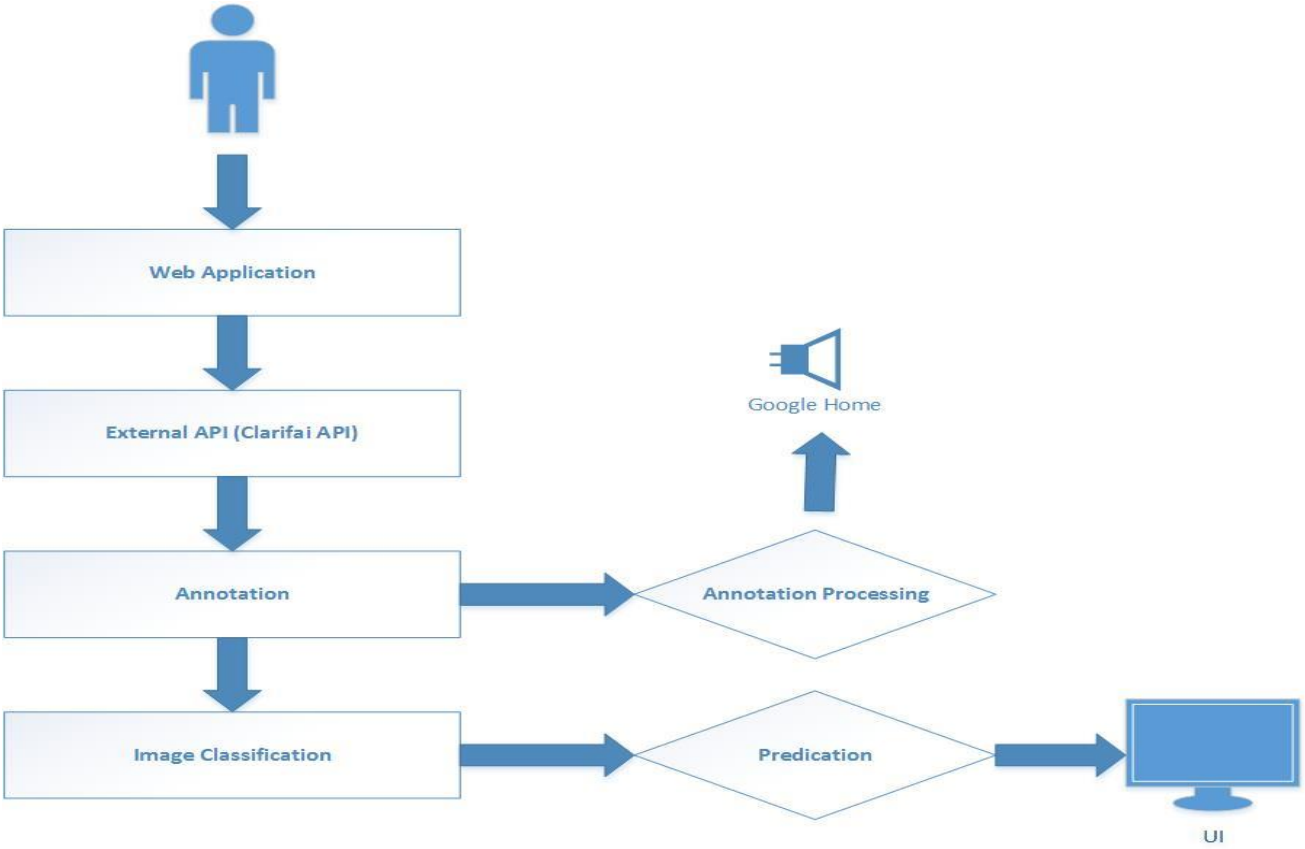
- **Open Source Projects**
  The Scientists Using VR to Tackle Climate Change
  http://thecreatorsproject.vice.com/blog/climate-change-vr-scientists

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

Implementation of Application using Clarify API and Google Conversation API

First,We took our dataset of global warming in form of video(.mkv format) which contain various concepts in global warming and then determined the keyframe images from that video, later we passed that key frame images to the Clarifai API. Clarifai API find the objects in the image and annotated objects according from higher to lower confidence score. We summaries the all the image object along with confidence score by pushing the data to MongoDB and then deploying into google home via Heroku to form meaningful summarized sentence.

Also, We have classified all our global warming data set and then trained model to predict the test data set in Client UI using Random forest model.

Connecting Clarifai API

```
final ClarifaiClient client = new ClarifaiBuilder("fLiPpuBuVY9S2agDztOQc8dBYoSyguXR0GxgicKy", "OEQpx7HzQHa2cLdr_hfhobyo7OWy61i85a_q
        .client(new OkHttpClient()) // OPTIONAL. Allows customization of OkHttp by the user
        .buildSync(); // or use .build() to get a Future<ClarifaiClient>
client.getToken();
```

Response Clarifai API

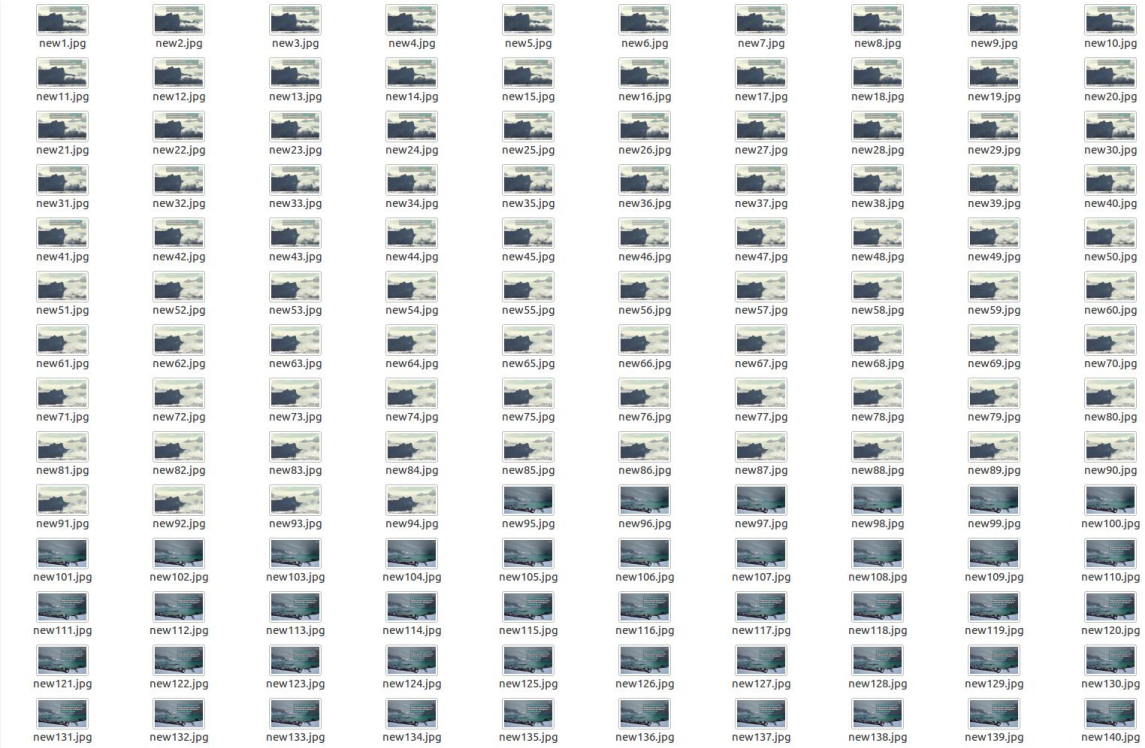
```
 //Getting the response from Clarifai API
 ClarifaiResponse response = client.getDefaultModels().generalModel().predict()
         .withInputs(
                 ClarifaiInput.forImage(ClarifaiImage.of(files[i]))
         ).executeSync();
 List<ClarifaiOutput<Concept>> predictions = (List<ClarifaiOutput<Concept>>) response.get();
```

Response for Google Conversation API

```
if (parameters.has("Frame")) {
    String words = parameters.getString("Frame").toString();
    String query = "https://api.mlab.com/api/1/databases/api_database/collections/sample?q={%22name%22:%22" + words + "%22}&apiKey=
    JSONObject jsonObject = getData(query);
    JSONObject js = new JSONObject();
    js.put("speech", "The objects in frame " + words + " are " + jsonObject.get("words") );
    js.put("displayText", "The objects in frame " + words + " are " + jsonObject.get("words") );
    js.put("source", "api_database");
    output = js.toString();
}
resp.setHeader("Content-type", "application/json");
resp.getWriter().write(output);
```

Documentation:

Key Frame Detection:



Main Frame Detection using Clarifai API:

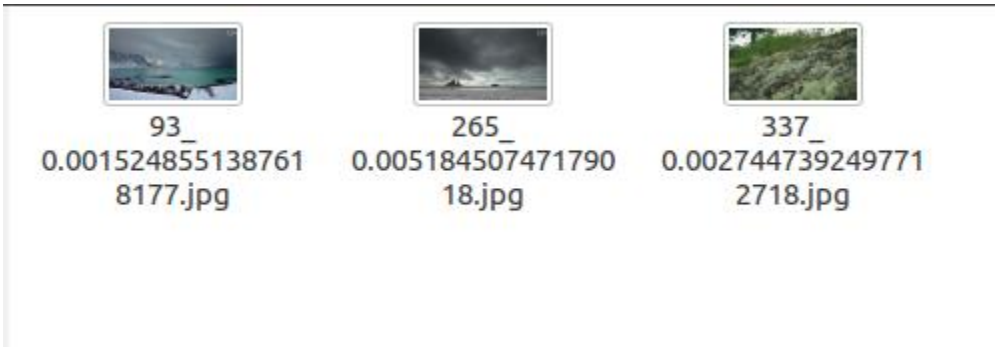
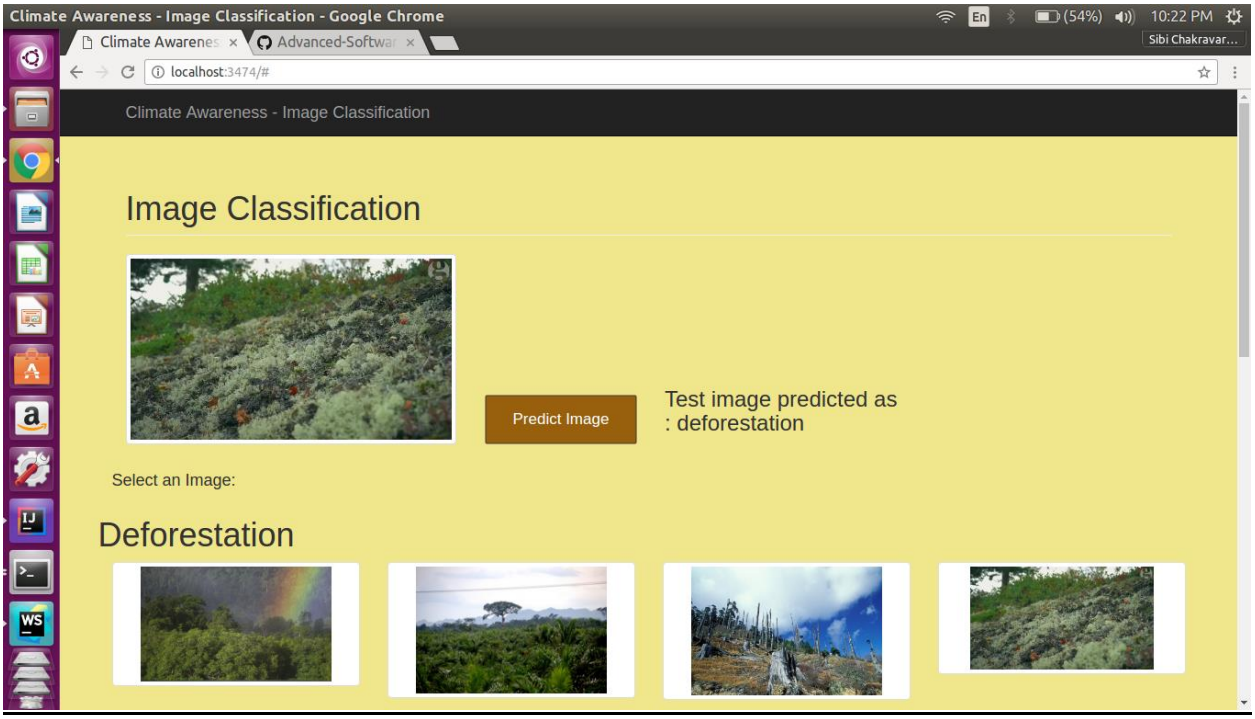
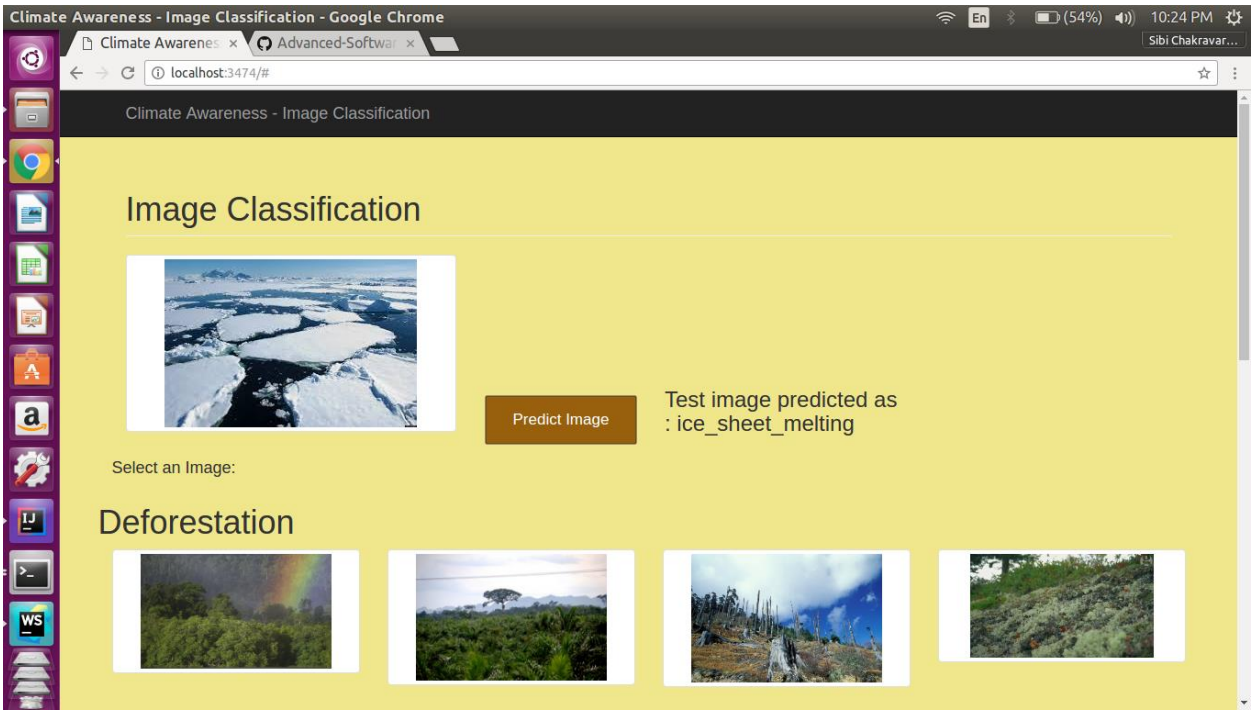


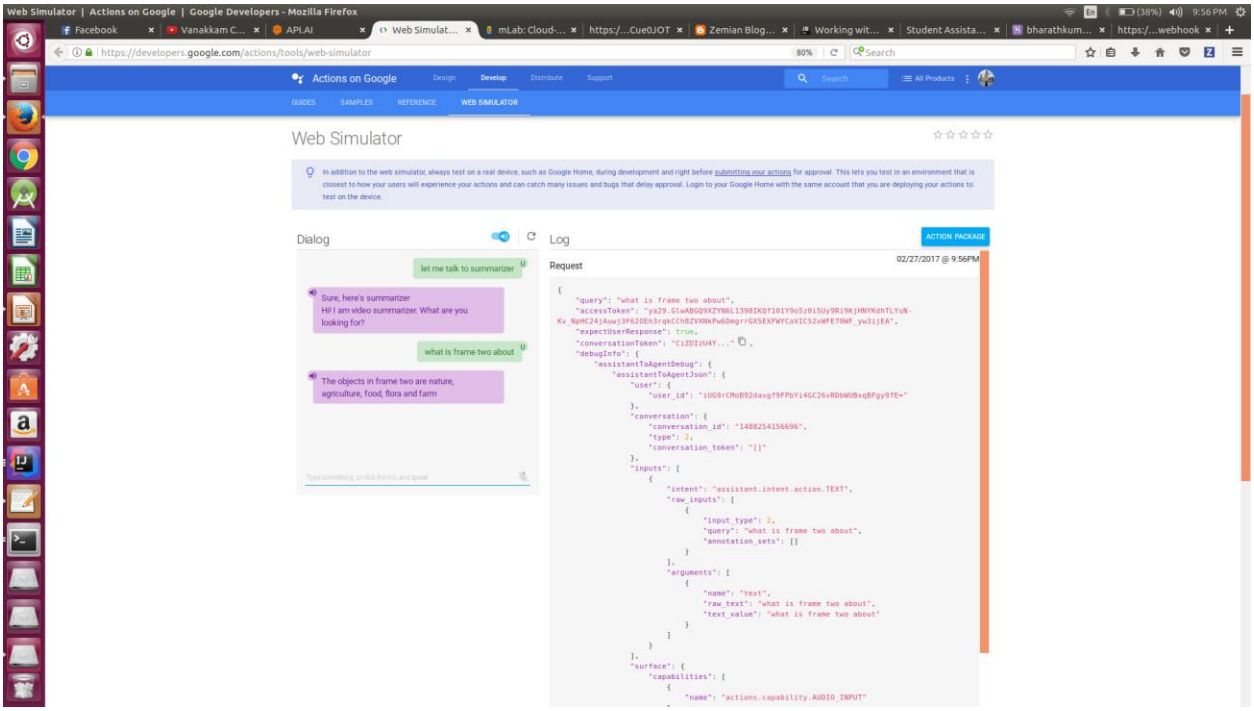
Image Annotation:

UI – Image Classification:

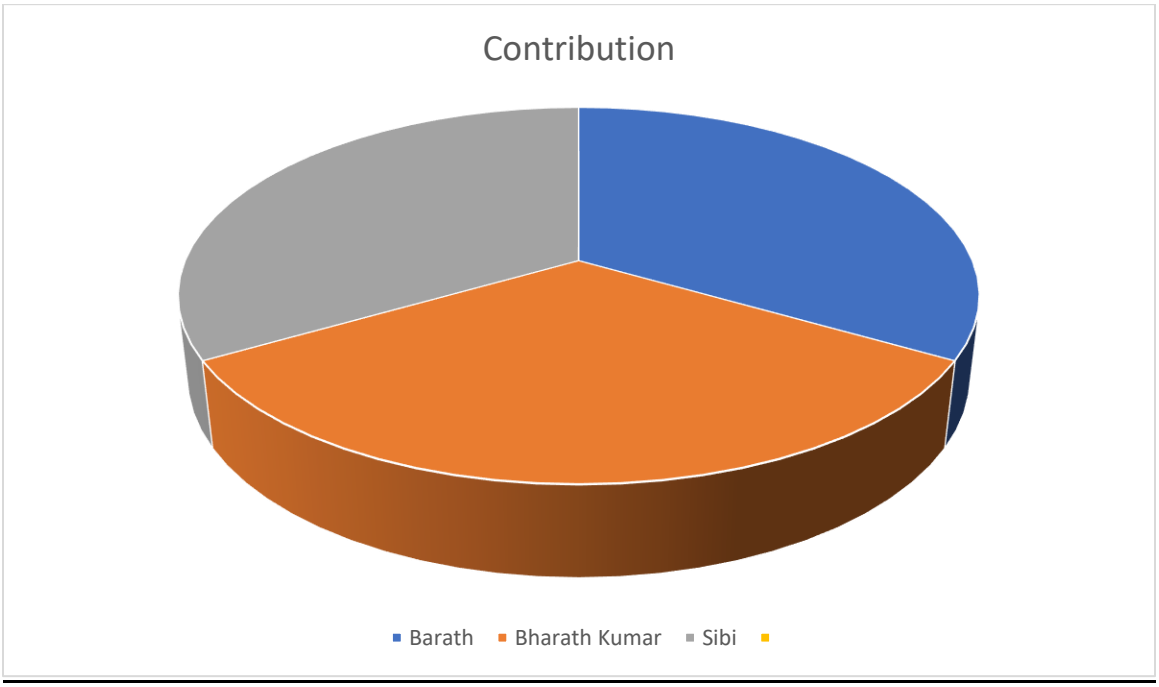




Google conversation API



Project Management



Contribution in Project:

Naravula Loganathan,Barath – 28

- Documentation
- Video Annotation – Clarifai

Natesan Arumugam,Bharath Kumar – 29

- Google Conversation API

Ramesh,Sibi Chakravarthy – 34

- Image Classification in ClientWeb