Assist Robot

Phase II

Project Report

Project Team – 8

Team Members

Priyadarsini Nidadavolu(17)

Deepthi Priyadarshini Penmetsa(22)

Dheeraja Vallabhaneni(28)

Tej Kumar Yentrapragada(33)

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1. Introduction:

The main goal of the project is to help people in finding their misplaced objects. Basically humans have a tendency to forget their belongings somewhere in their house and search for it for hours together. For example, if I have an important business meeting to attend, but I don't remember where I placed my car keys, then I will be in huge loss. So to prevail in these circumstances here comes our Friendly Robot- My Friend which could assist me in keeping track of my personal things. So what this robot will do is that it will have entire map (laser scan) of the building and objects in the building in its memory. So we will feed the robot with the objects that are highly important to us, like car keys, some files, phone and laptop. This robot will keep its eye on these objects and notify their location to its master upon request. Additionally our Robot who will be an eFriend who will help us to choose the furniture to our home. Also our robot will suggest us the top rated books.

2. Project Goal and Objectives:

The primary goals of our project is described below:

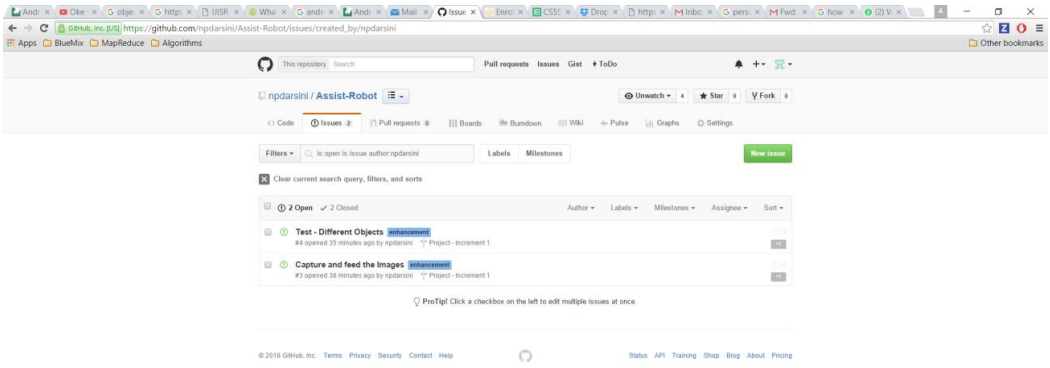
- To implement a module which has an interaction with robot. Eg: You can ask few questions to the robot and the Robot will be responding to you back. You can ask the robot about your misplaced phone. So that it will answer you after it had found the phone.
- To make the robot learn about the personal items like laptops, phones, watch, keys etc.
- To design a robot which can find the learned objects that are misplaced in a building.
- To build a recommendation system which will be able to recommend the list of books which are rated high and are related to our interests.
- To build a recommendation system which will suggest us about the latest furniture details, their quality and from which brand/ shop we could purchase from. This feature enables us to decorate our houses with rich interior designing.
- To send a notification to your smart watch when it finds the lost object.
- To remind the user about his day to day events that were previously taught.
- To make the robot act as an assistant in getting things specified by the user. (Mr Robot – Get me my phone).

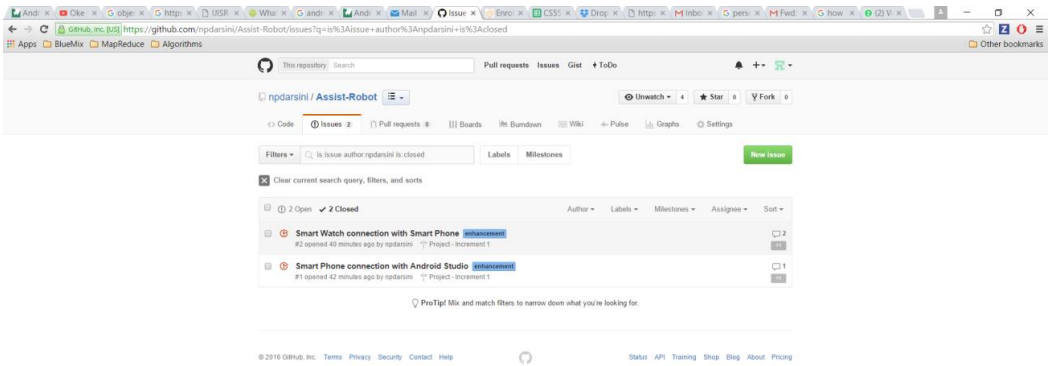
- To make a single robot act as assistant to all the people living in same house. It recognizes the user first and then assists that particular user in finding the belongings.

3. Project Plan:

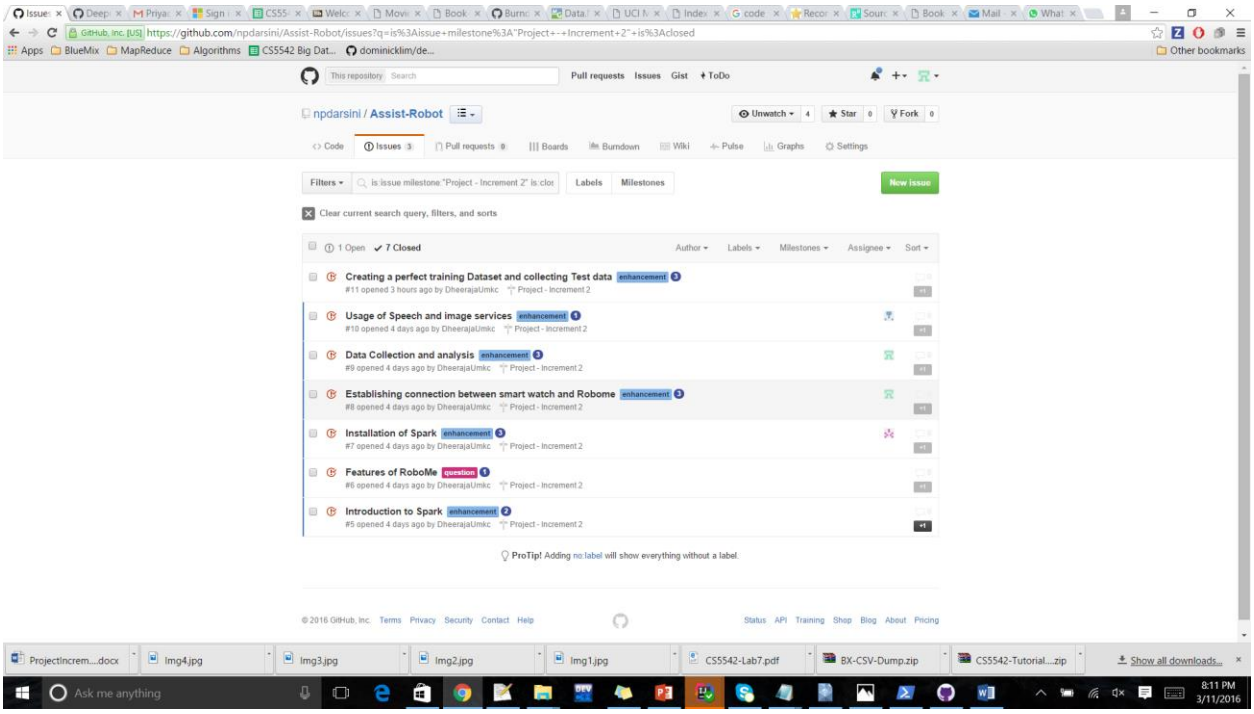
3.1 Schedule:

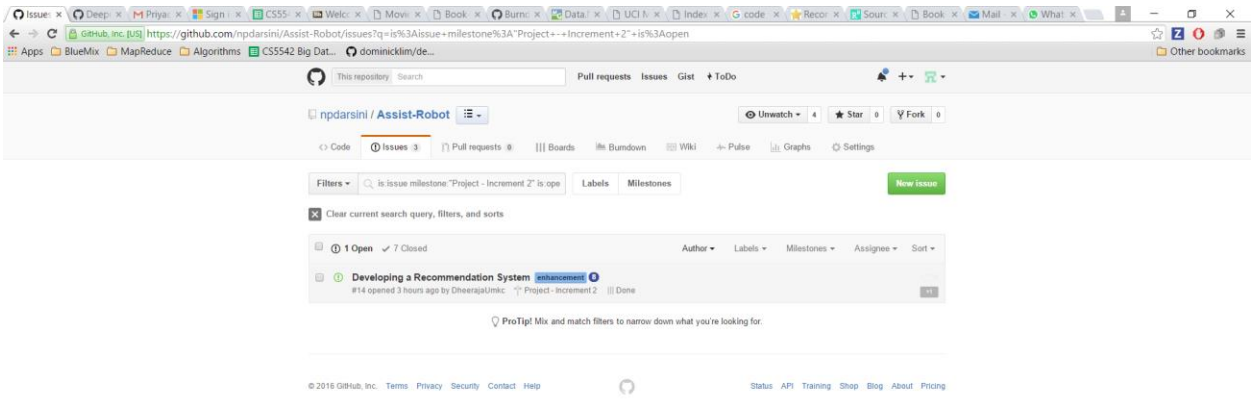
Stories: Four user stories had been created as part of Iteration 1. Here are the snapshots for the stories which are in closed and opened state.



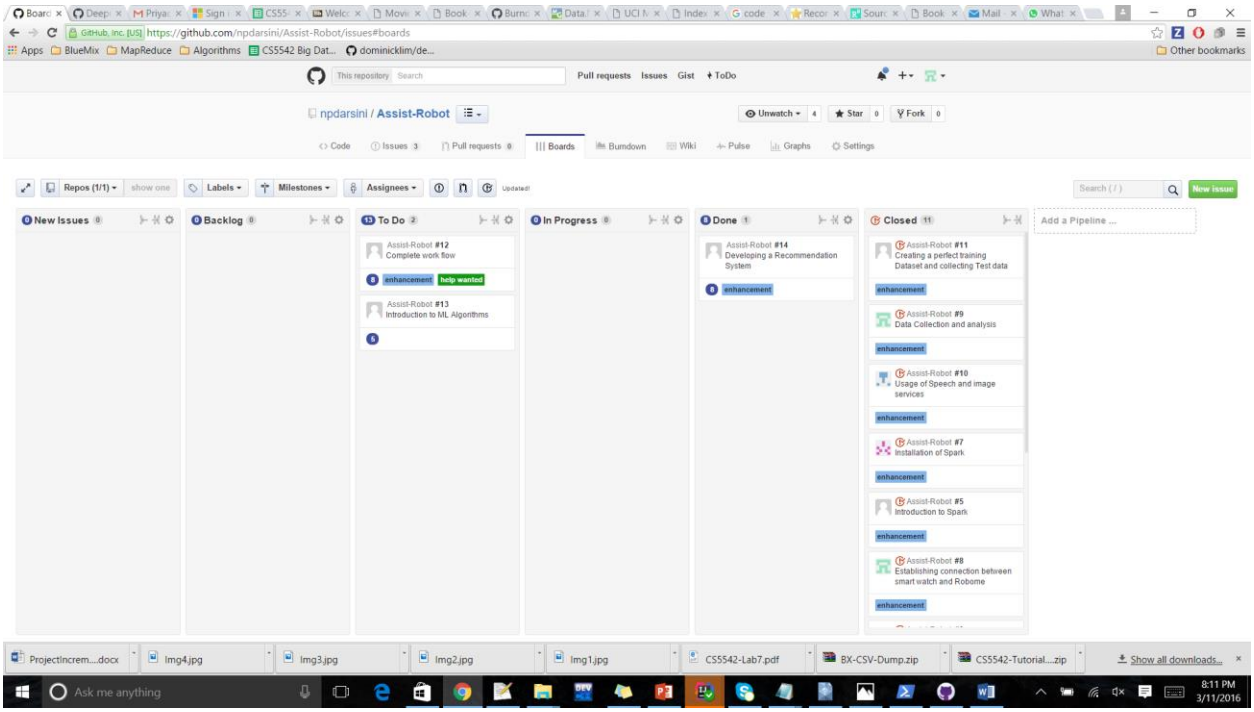


Stories: Eight user issues had been created as part of Iteration 2. Here are the snapshots for the stories which are in closed and opened state.

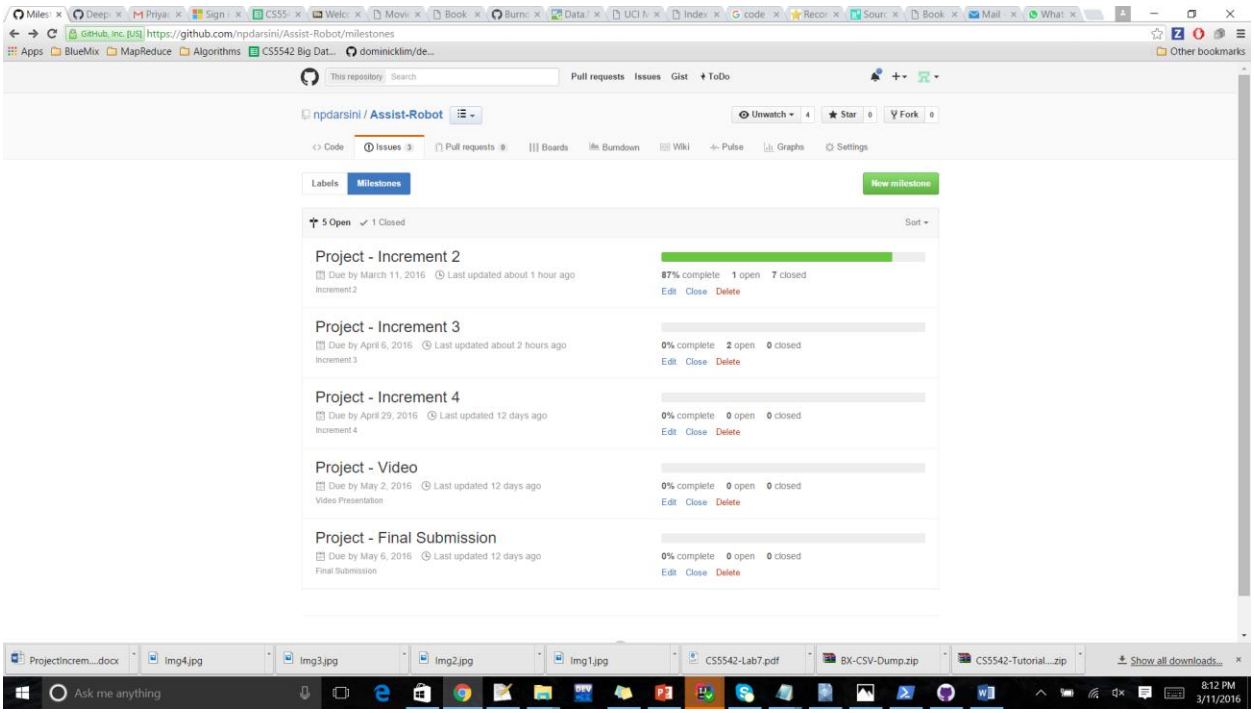




Board:

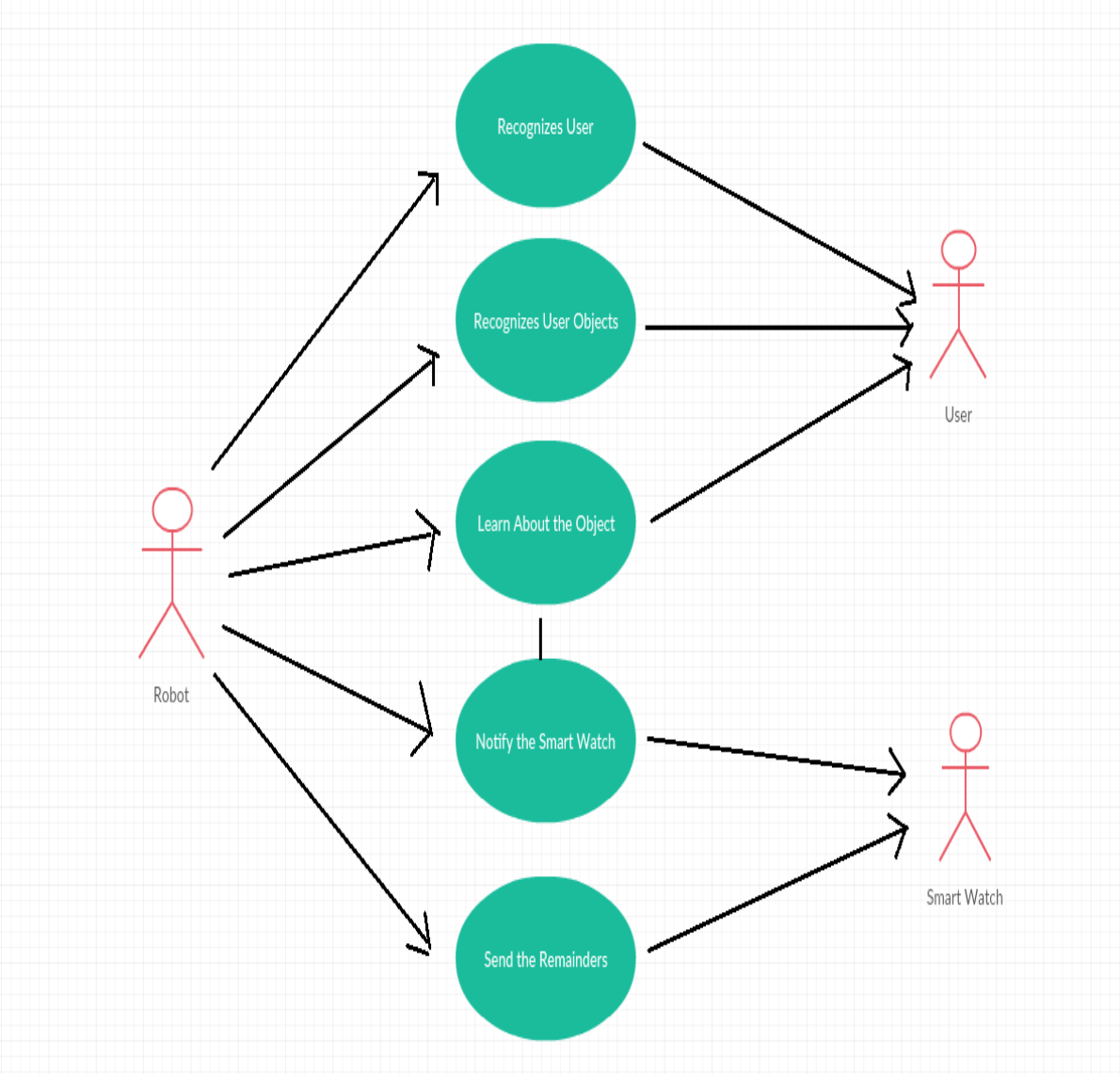


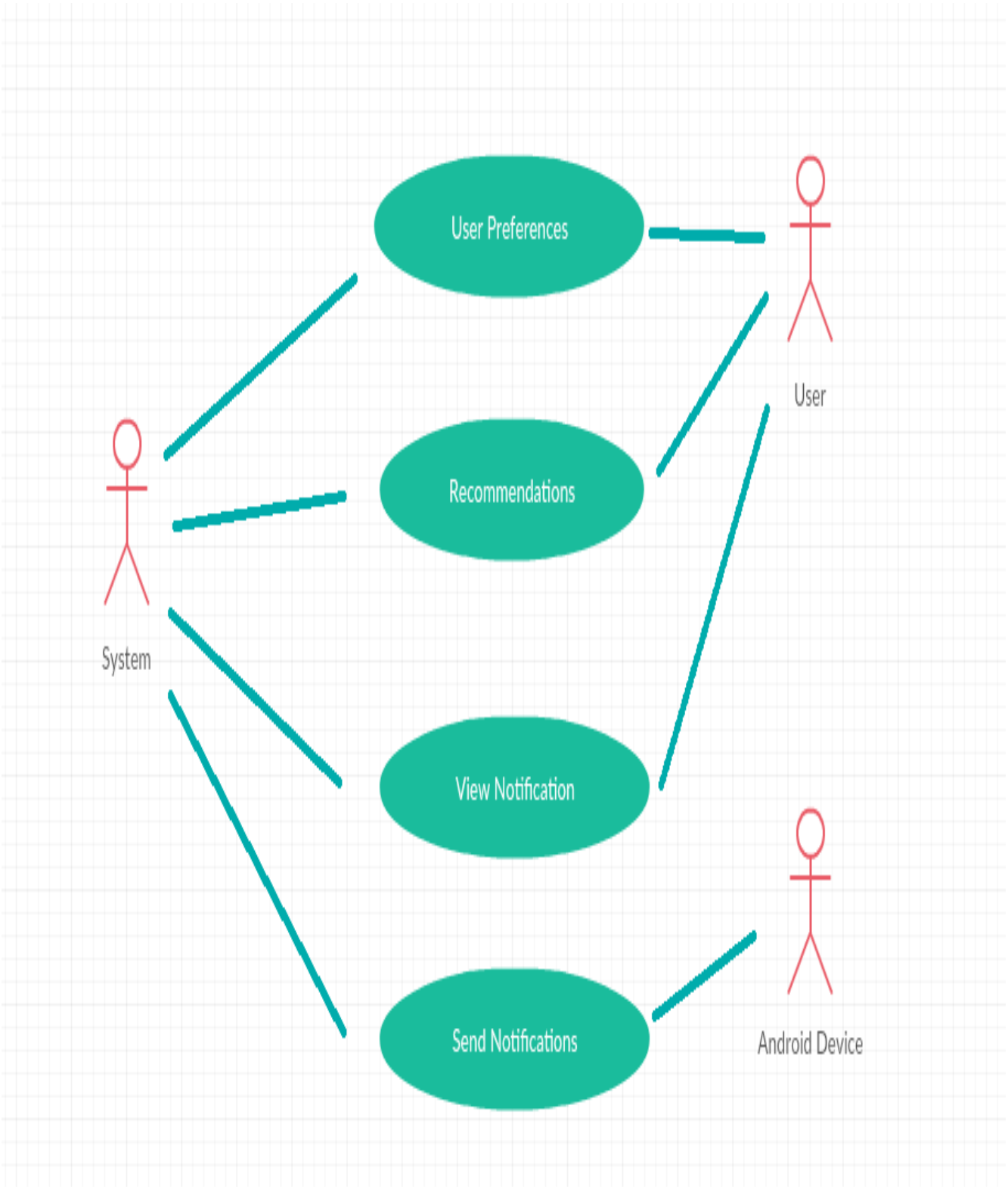
Milestones:



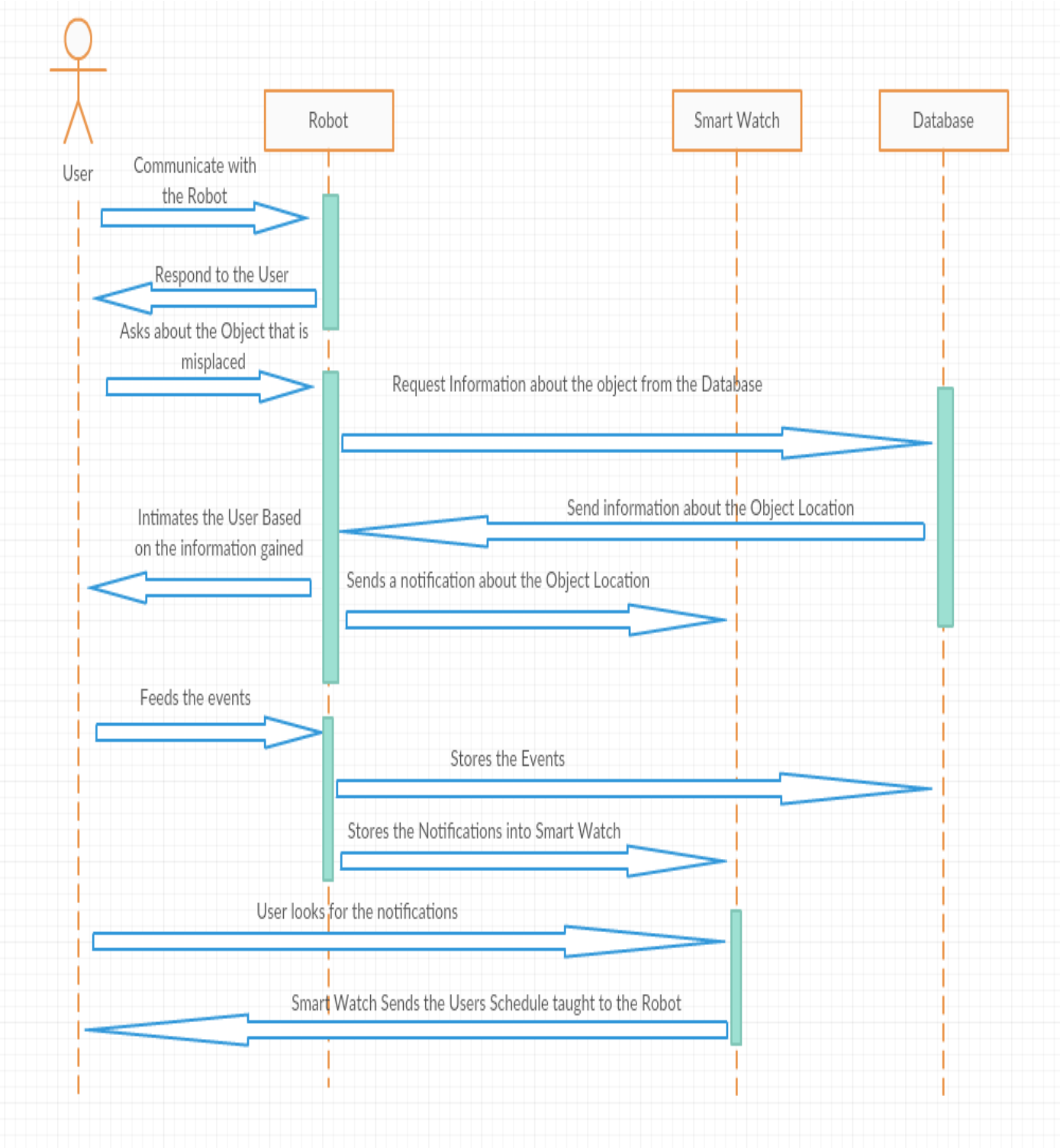
3.1.1 UML Diagrams:

Use Case Diagram

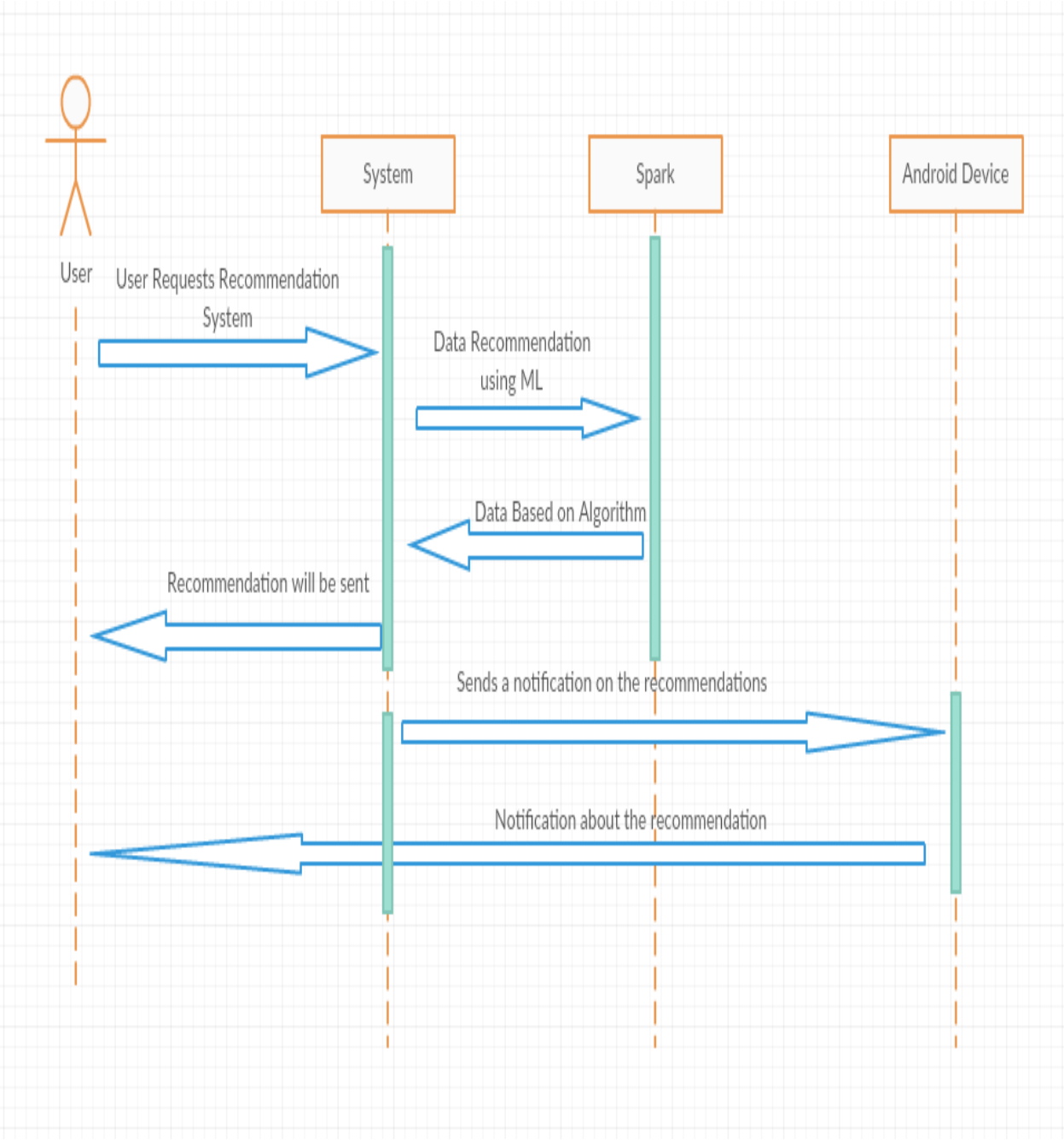



User Preferences
User
Recommendations
System
View Notification
Send Notifications
Android Device

Sequence Diagram:



Sequence Diagram for Recommendation System



3.2 Project Timelines:

Increment	Deadline
Increment 1	19 February 2015
Increment 2	11 March 2016
Increment 3	6 April 2016
Increment 4	29 April 2016
Final Submission	6 May 2016

3.2.1 Team Members:

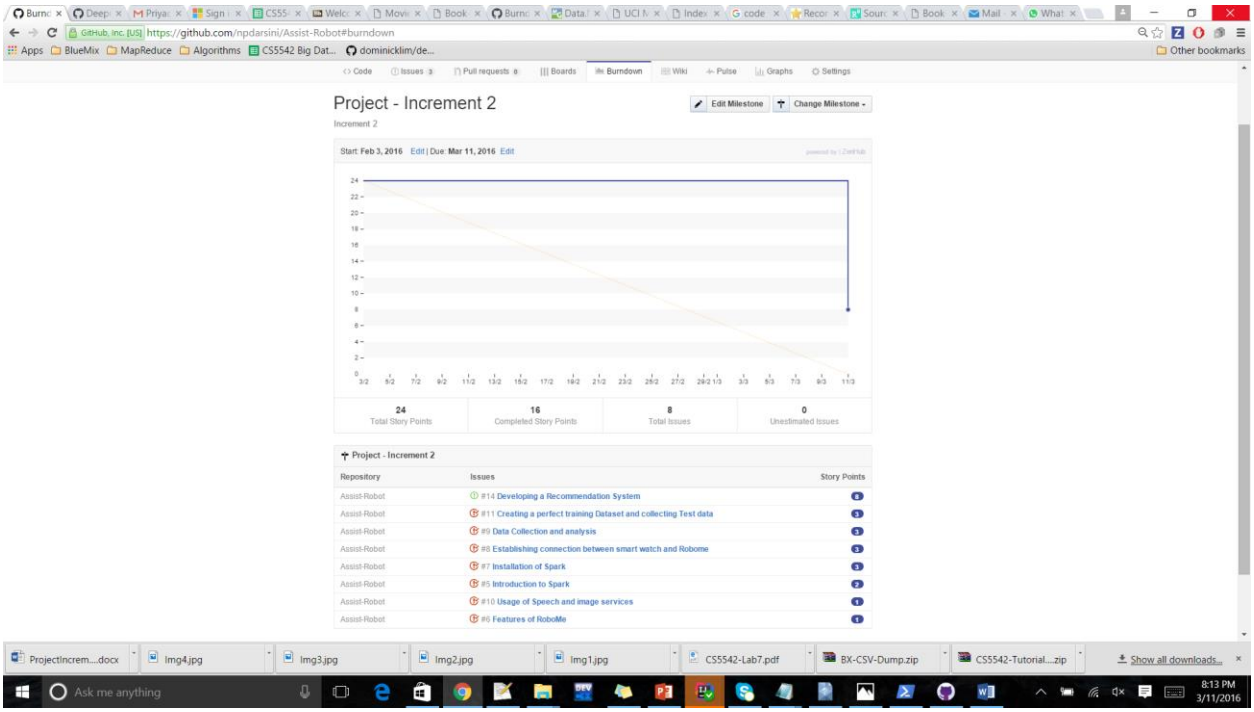
1. Priyadarsini Nidadavolu – 17
2. Deepthi Priyadarshini Penmetsa – 22
3. Dheeraja Vallabhaneni – 28
4. Tej Kumar Yentrapragada – 33

3.2.2 Tasks and Responsibilities:

- **Machine Learning and R Programming –** Deepthi Priyadarshini Penmetsa
- **Spark and Hadoop Technologies –** Priyadarsini Nidadavolu
- **Objective C and IOS Programming –** Tej Kumar Yentrapragada
- **Android Programming -** Dheeraja Vallabhaneni

3.3 Burndown Chart:

Burndown:



4. Increment Report

4.1 Incremental Explanations

4.1.1 Phase 1 -Existing API:

IBM Alchemy API

This API basically performs machine learning and natural language processing techniques. Some of its features include semantic text analysis, sentimental analysis, deep learning, face detection and reorganization, speech to text and vice versa conversions etc. In this we had used this API in order to recognize the objects that we want to teach the Robot.

Achievements upon using this API – The Robot could identify basic objects like laptop, phone, bottle etc.

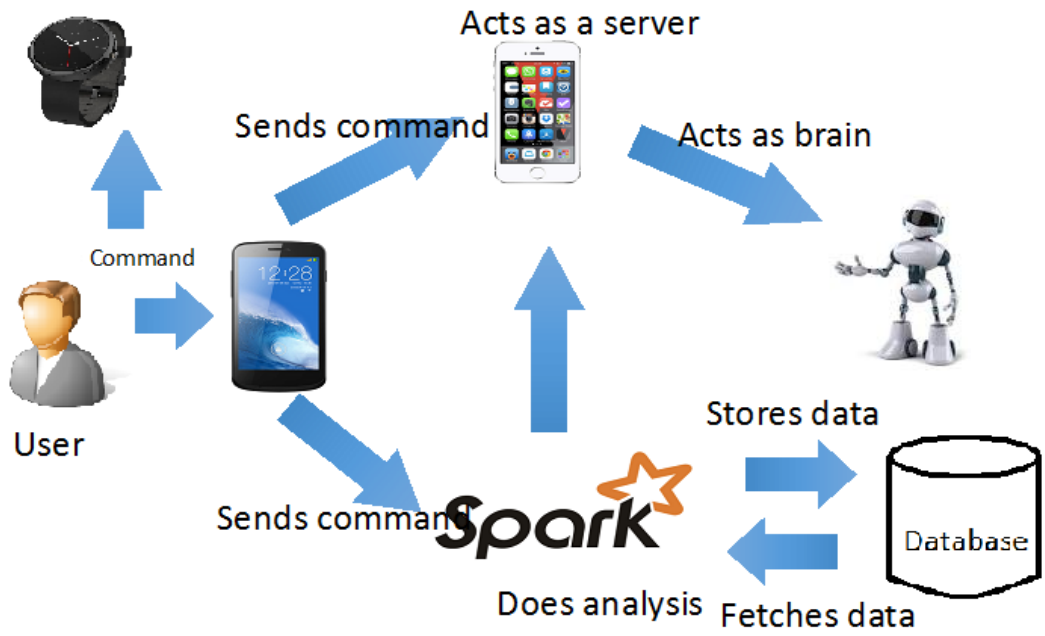
4.1.2 Phase 2 - Recommendation System:

In this phase we had developed two recommendation systems which can recommend the user about the popular furniture showrooms and the famous books. In this we provided the training set with user information (uid, name, ratings etc.,), furniture information (list of showrooms, location) and the book information (name, author etc.,).

The recommended notification has been sent to the android device (smart watch/phone) using Spark-Android Socket programming techniques.

4.2 Design of Features:

The architecture of our system could be like the user can give commands to the client device which is android phone. Further the Iphone which acts as a server could take commands from the android phone and passes it to the Robot. The Robot performs the necessary actions of the received command and return back to the Android Phone. It also sends the notifications to the Android Smart Watch. The Android device can also pass the command to the Spark and fetch the data from the database (MongoDB, Hadoop DB). Our system will be able to recommend the user based on the trained data sets and the notifications will be sent to the android device.



System Features

The following are the features that were developed as part of Phase I:
We had used IBM's Alchemy API and able to make our Robot to detect the object and return the object name as a result.

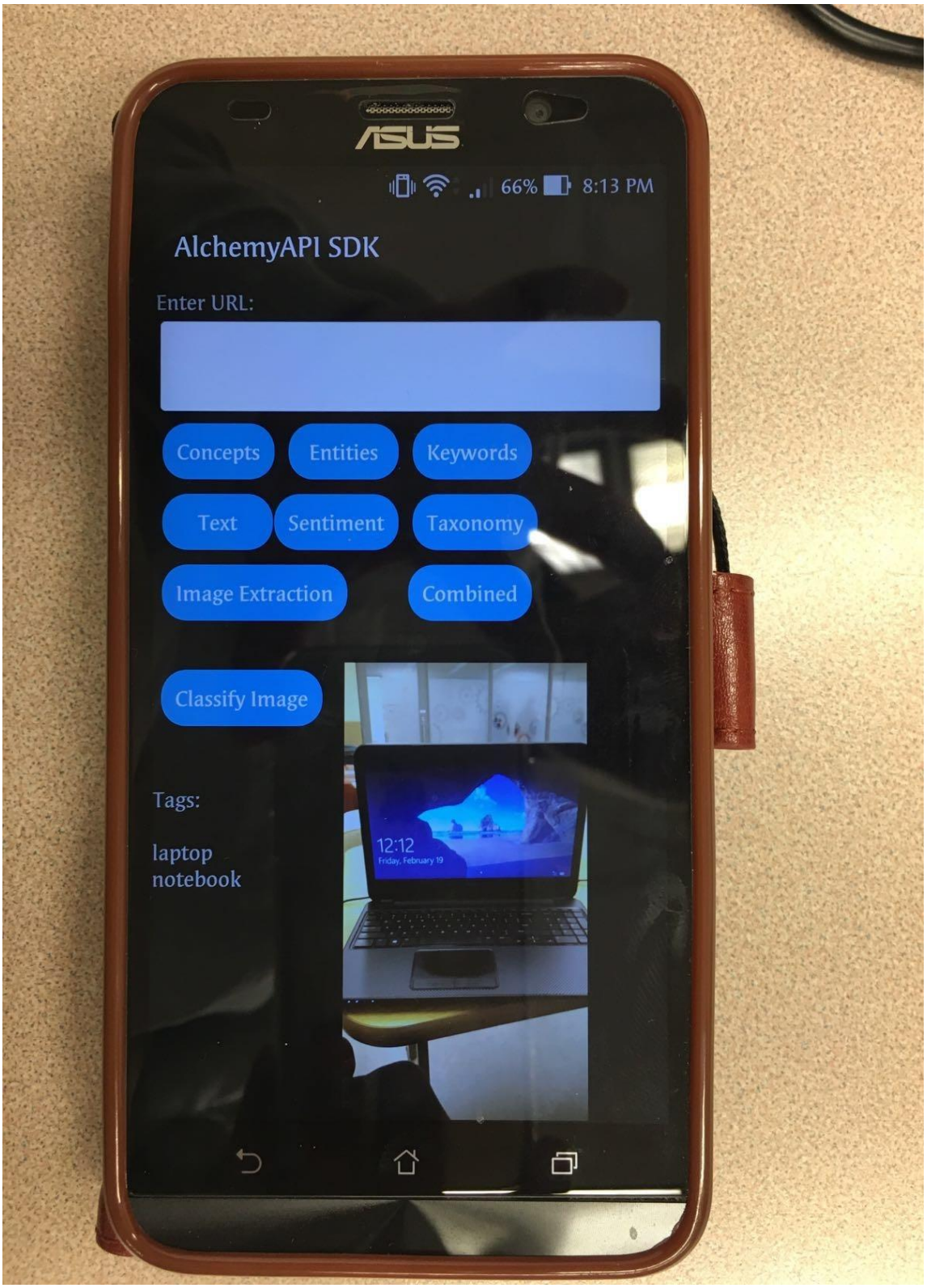
The following are the features that are developed as part of Phase II:

We had used machine learning algorithms to develop a recommendation system. In this phase we had developed two recommendation systems with which the system will be able to suggest top rated books to the user based on his interests and the furniture showrooms which could be available for cheaper prices with the location. Basically, we had provided the training data sets and the user preferences which serves as a key inputs for the system. We were also able to connect our system to the android device to which the recommendations has been sent.

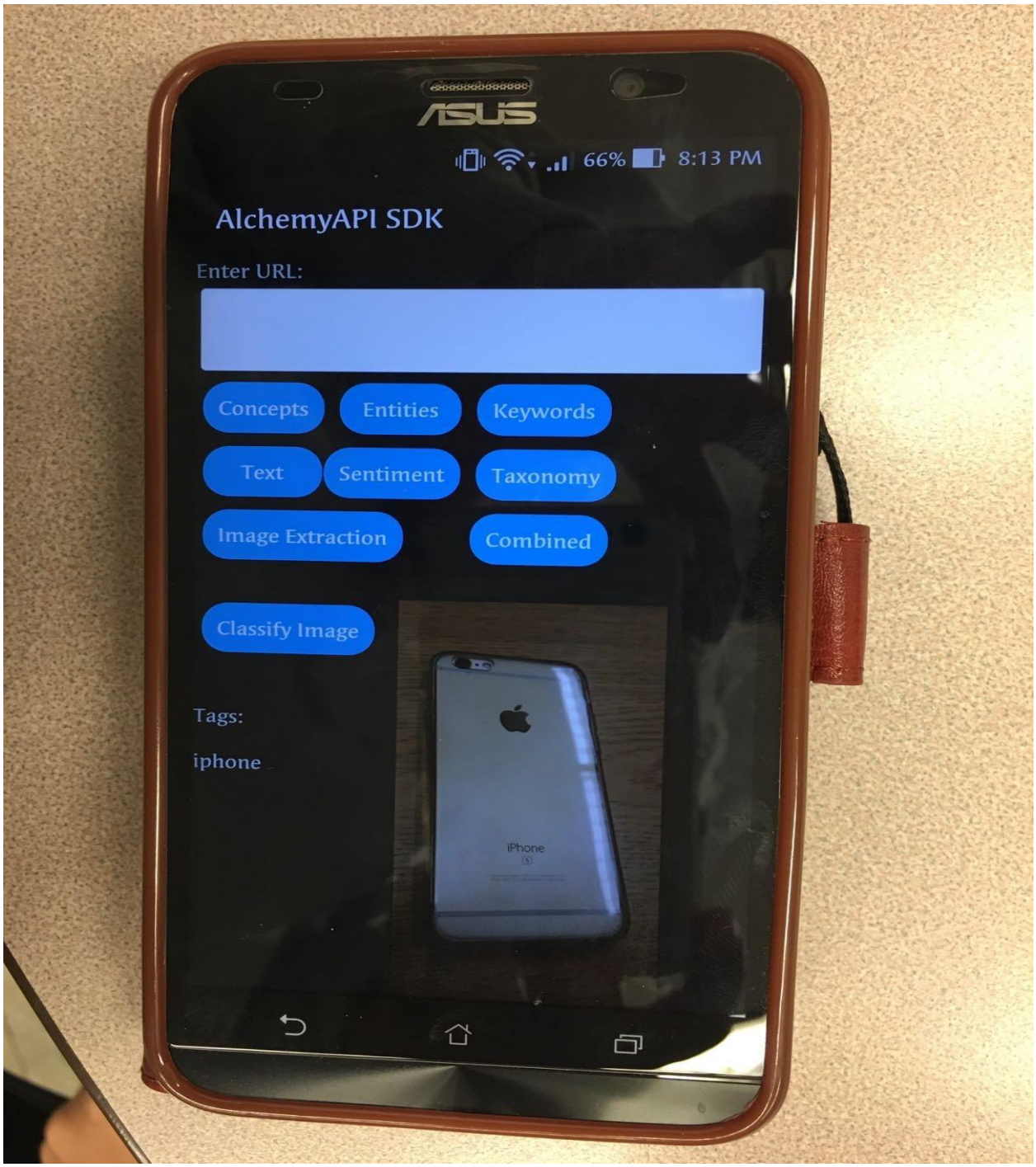
4.3 Implementation:

Mobile Client Implementation – Snapshots

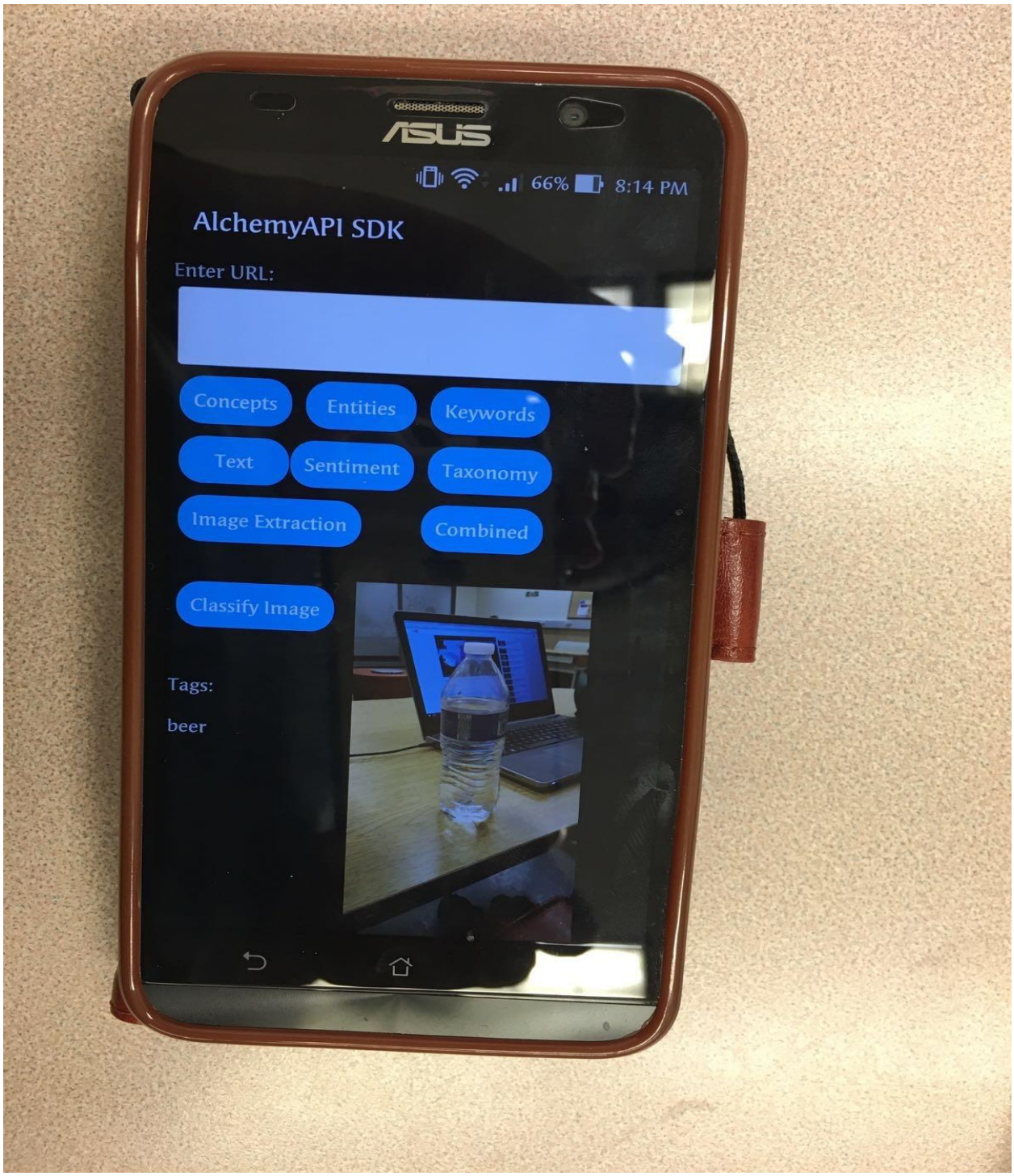
This snapshot shows us that the application is able to identify the object and names its Laptop.


ASUS
66% 8:13 PM
AlchemyAPI SDK
Enter URL:
Concepts
Entities
Keywords
Text
Sentiment
Taxonomy
Image Extraction
Combined
Classify Image
Tags:
laptop
notebook
12:12
Friday, February 19

This snapshot shows us that the application is able to identify the object and names it as an Iphone.



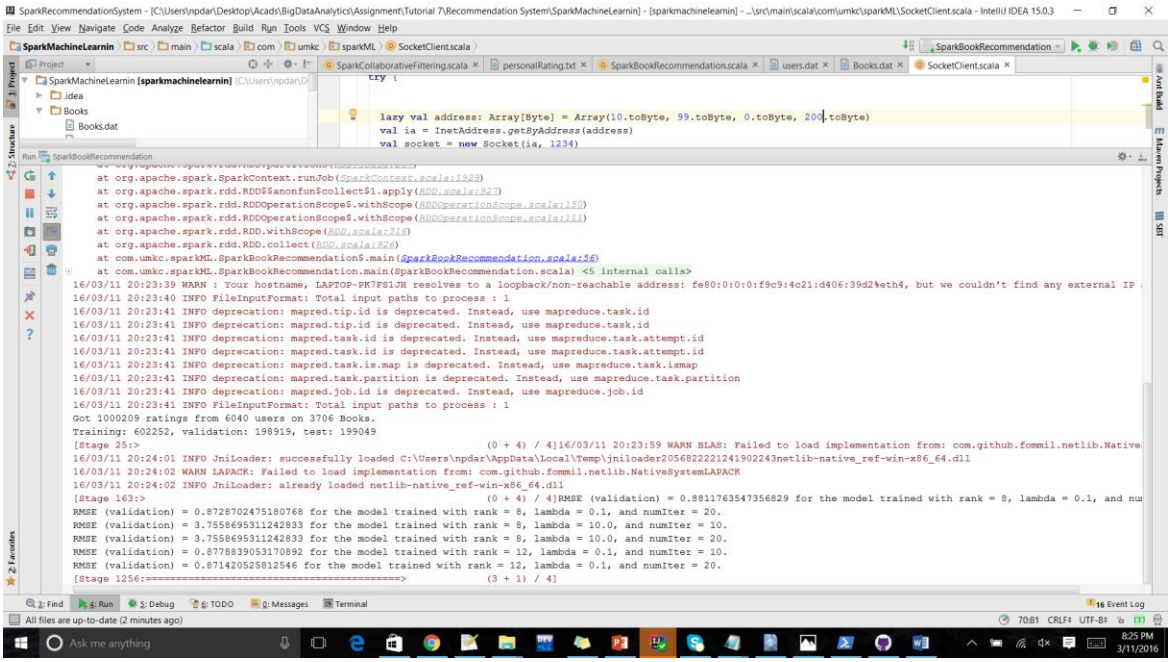
This snapshot shows us that the application is able to identify the bottle.



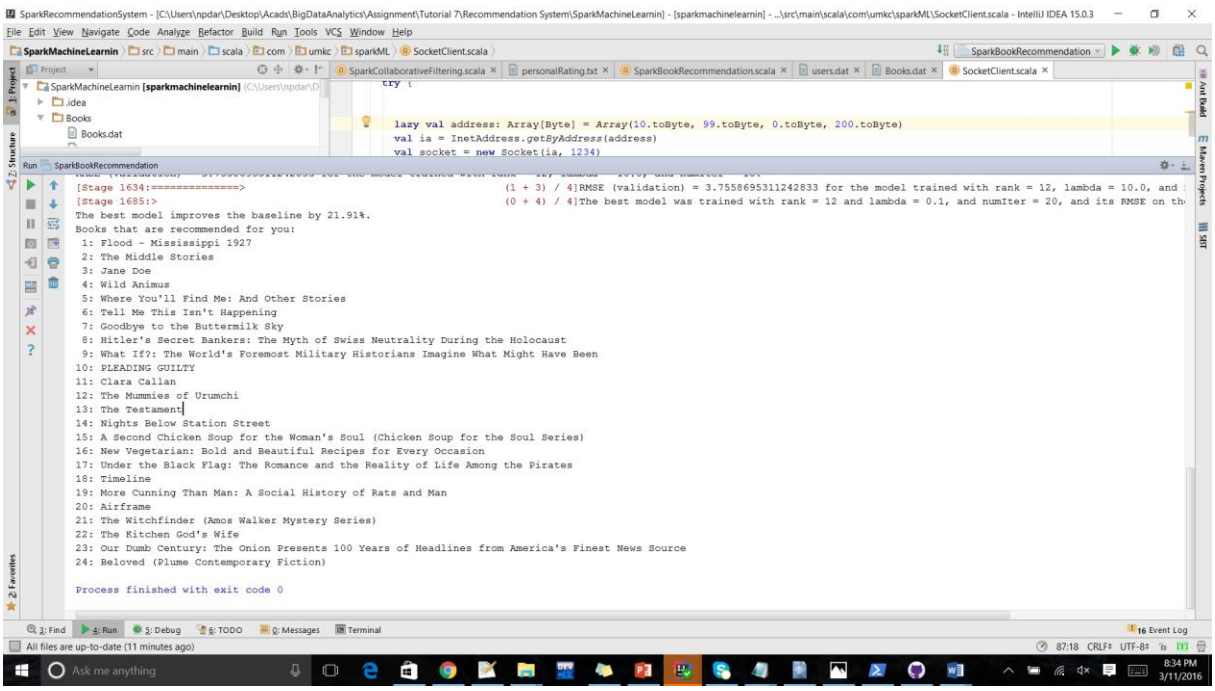
Recommendation System Snapshots:

Books Recommendation System:

Phase at which the analyzation of training data set is taking place.



Recommended Books

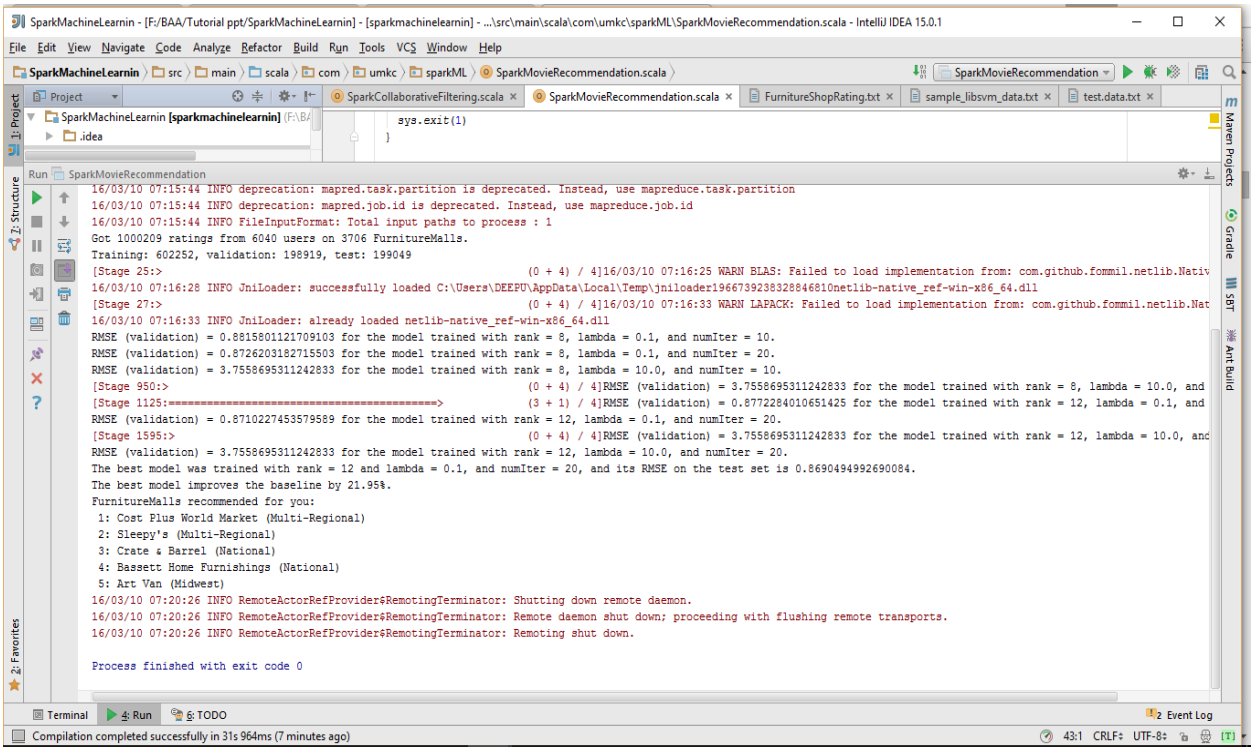


We had also sent the recommended books to the smart phone as a notification:

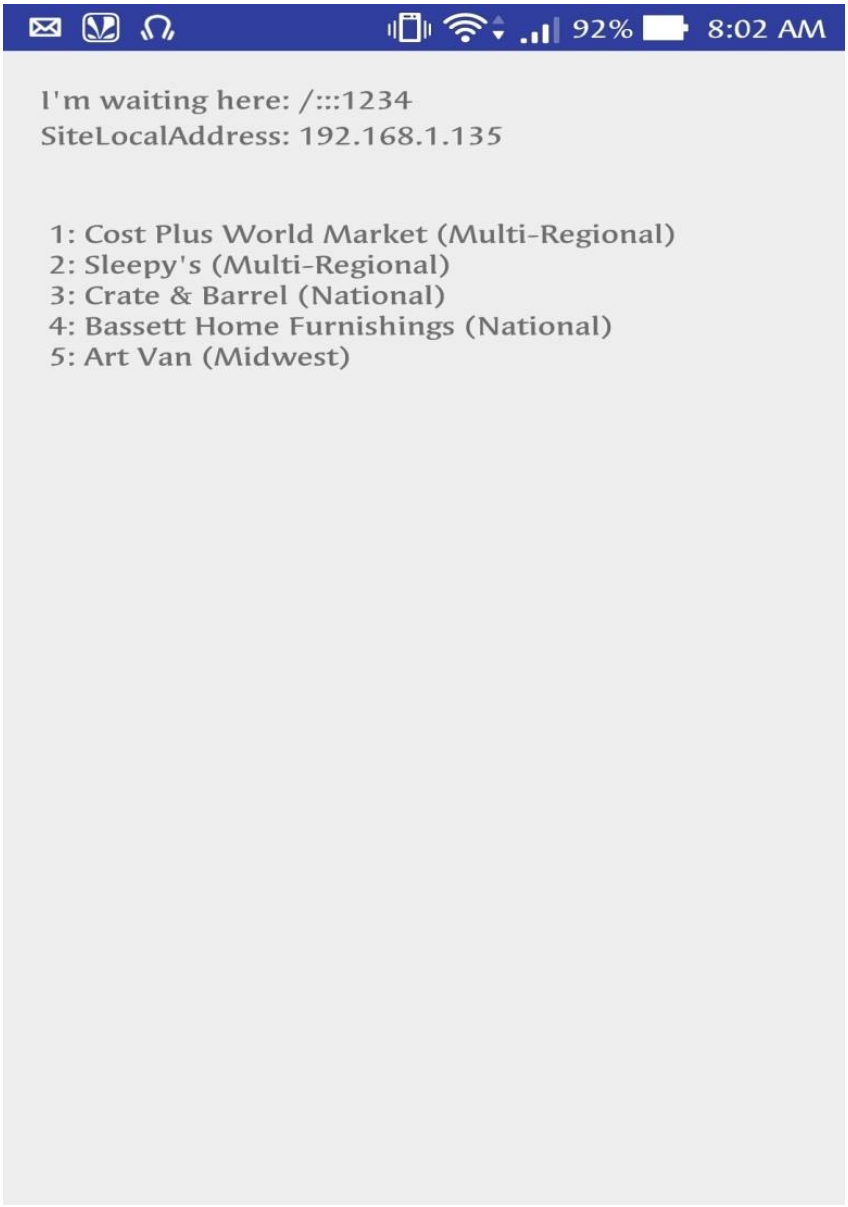
Furniture Malls Recommendation System

```
Got 1000209 ratings from 6040 users on 3706 FurnitureMalls.
Training: 602252, validation: 198919, test: 199049
[Stage 25:>                                                         (0 + 4) / 4]16/03/10 07:16:25 WARN BLAS: Failed to load implementation from: com.github.fommil.netlib.Nativ
16/03/10 07:16:28 INFO JniLoader: successfully loaded C:\Users\DEEPU\AppData\Local\Temp\jniloader1966739238328846810netlib-native_ref-win-x86_64.dll
[Stage 27:>                                                         (0 + 4) / 4]16/03/10 07:16:33 WARN LAPACK: Failed to load implementation from: com.github.fommil.netlib.Nat
16/03/10 07:16:33 INFO JniLoader: already loaded netlib-native_ref-win-x86_64.dll
RMSE (validation) = 0.8815801121709103 for the model trained with rank = 8, lambda = 0.1, and numIter = 10.
RMSE (validation) = 0.8726203182715503 for the model trained with rank = 8, lambda = 0.1, and numIter = 20.
RMSE (validation) = 3.7558695311242833 for the model trained with rank = 8, lambda = 10.0, and numIter = 10.
[Stage 950:>                                                        (0 + 4) / 4]RMSE (validation) = 3.7558695311242833 for the model trained with rank = 8, lambda = 10.0, and
[Stage 1125:============================================>            (3 + 1) / 4]RMSE (validation) = 0.8772284010651425 for the model trained with rank = 12, lambda = 0.1, and
RMSE (validation) = 0.8710227453579589 for the model trained with rank = 12, lambda = 0.1, and numIter = 20.
[Stage 1595:>                                                       (0 + 4) / 4]RMSE (validation) = 3.7558695311242833 for the model trained with rank = 12, lambda = 10.0, and
RMSE (validation) = 3.7558695311242833 for the model trained with rank = 12, lambda = 10.0, and numIter = 20.
The best model was trained with rank = 12 and lambda = 0.1, and numIter = 20, and its RMSE on the test set is 0.8690494992690084.
The best model improves the baseline by 21.95%.
```

This Screenshot shows the Furniture Malls recommended to you:



The notification has been sent to the android mobile which shows the recommended furniture list.



4.4 Deployment:

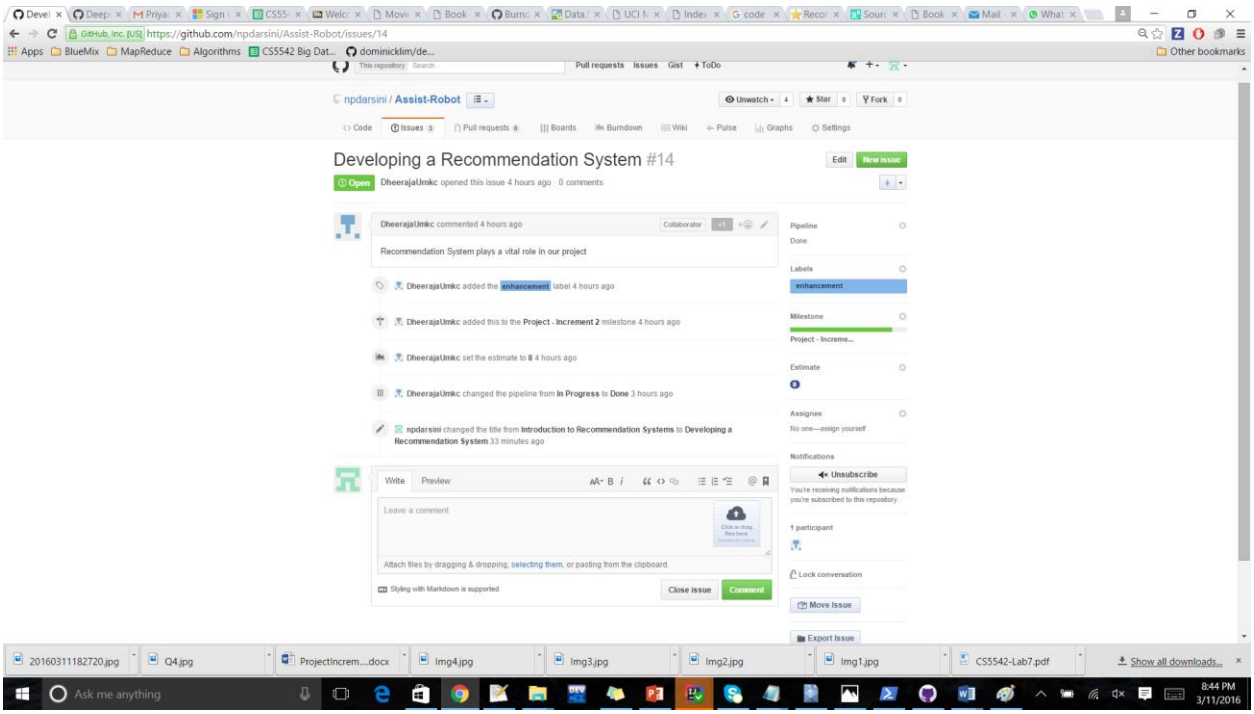
Git Hub Link:

https://github.com/npdarsini/Assist-Robot

5. Project Management:

5.1 Implementation status report:

35% implementation has been implemented. This phase involves the development of recommendation systems with which the user will be notified about the top rated books and the best place to buy his/her furniture. Also the notification will be sent to the connected android device, to make the user work easier. The team members has an equal contribution towards the development and it took around 5 complete days to give an outlook for this phase. First we had tried developing a recommendation system for books, and had used this knowledge to develop the Furniture Recommendation System. Later the notification has been sent to the android device. Assuming the user will be carrying the smart android device every single time, we thought that this could be as an innovative thought as the user don't need to look for the advice in the system every time.


https://github.com/npdarsini/Assist-Robot/issues/14
npdarsini / Assist-Robot
Developing a Recommendation System #14
Open
DheerajaUmkc opened this issue 4 hours ago · 0 comments
DheerajaUmkc commented 4 hours ago
Recommendation System plays a vital role in our project
DheerajaUmkc added the enhancement label 4 hours ago
DheerajaUmkc added this to the Project - Increment 2 milestone 4 hours ago
DheerajaUmkc set the estimate to 8 4 hours ago
DheerajaUmkc changed the pipeline from In Progress to Done 3 hours ago
npdarsini changed the title from Introduction to Recommendation Systems to Developing a Recommendation System 33 minutes ago
Write
Preview
Leave a comment
Attach files by dragging & dropping, selecting them, or pasting from the clipboard.
Styling with Markdown is supported
Close issue
Comment
Pipeline
Done
Labels
enhancement
Milestone
Project - Increme...
Estimate
Assignee
No one—assign yourself
Notifications
Unsubscribe
You're receiving notifications because you're subscribed to this repository.
1 participant
Lock conversation
Move Issue
Export Issue
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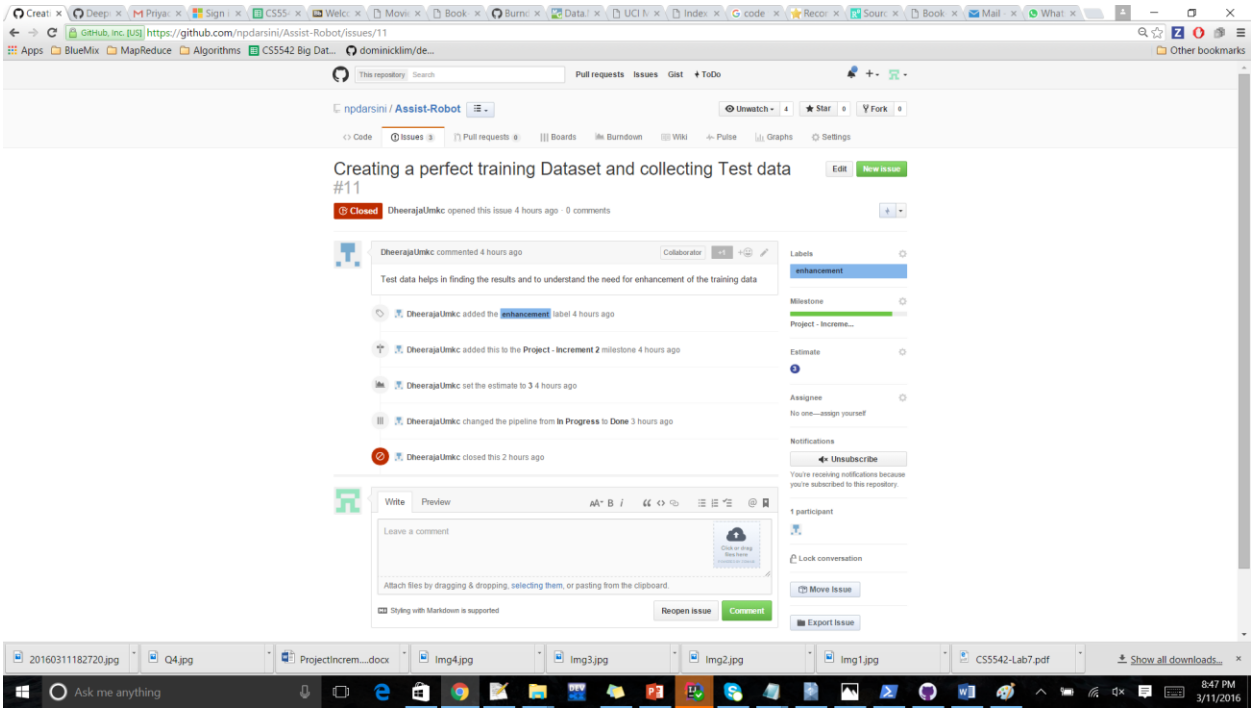
Q4.jpg
ProjectIncrem....docx
Img4.jpg
Img3.jpg
Img2.jpg
Img1.jpg
CS5542-Lab7.pdf
Show all downloads...
Ask me anything
8:44 PM
3/11/2016


https://github.com/npdarsini/Assist-Robot/issues/11
npdarsini / Assist-Robot
Creating a perfect training Dataset and collecting Test data #11
Closed
DheerajaUmkc opened this issue 4 hours ago · 0 comments
DheerajaUmkc commented 4 hours ago
Test data helps in finding the results and to understand the need for enhancement of the training data
DheerajaUmkc added the enhancement label 4 hours ago
DheerajaUmkc added this to the Project - Increment 2 milestone 4 hours ago
DheerajaUmkc set the estimate to 3 4 hours ago
DheerajaUmkc changed the pipeline from In Progress to Done 3 hours ago
DheerajaUmkc closed this 2 hours ago
Write
Preview
Leave a comment
Attach files by dragging & dropping, selecting them, or pasting from the clipboard.
Styling with Markdown is supported
Reopen issue
Comment
Labels
enhancement
Milestone
Project - Increme...
Estimate
Assignee
No one—assign yourself
Notifications
Unsubscribe
You're receiving notifications because you're subscribed to this repository.
1 participant
Lock conversation
Move Issue
Export Issue
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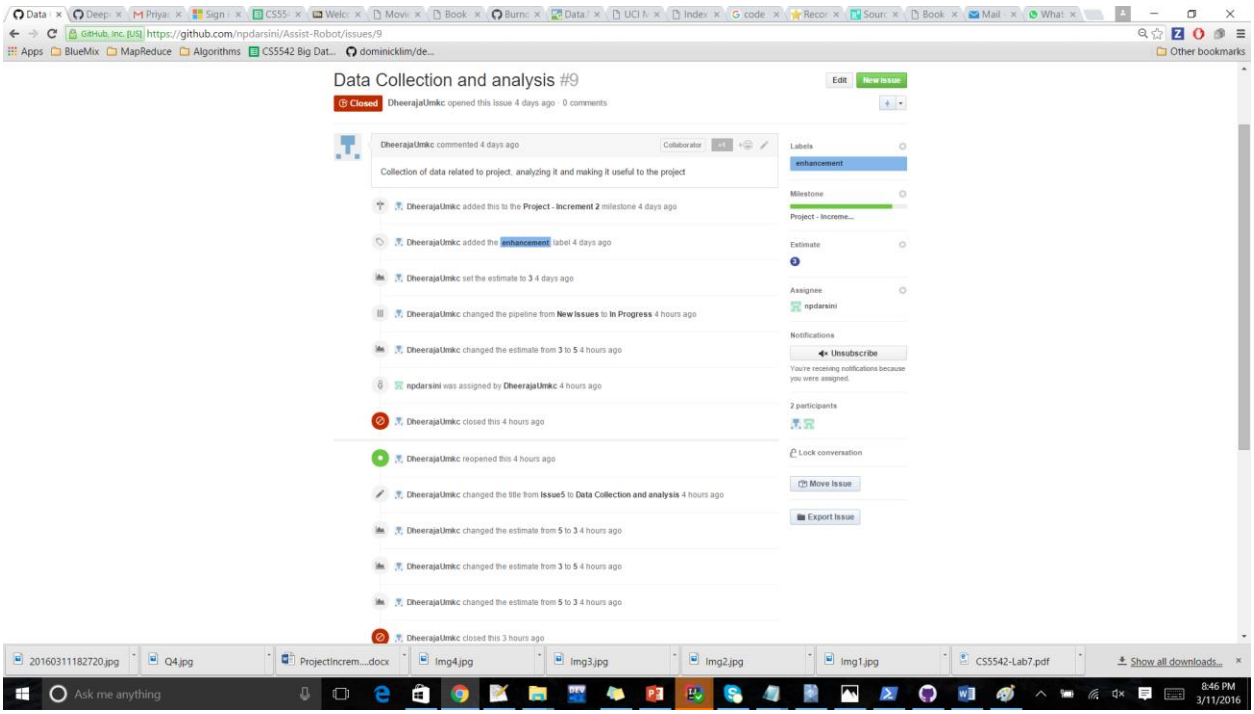
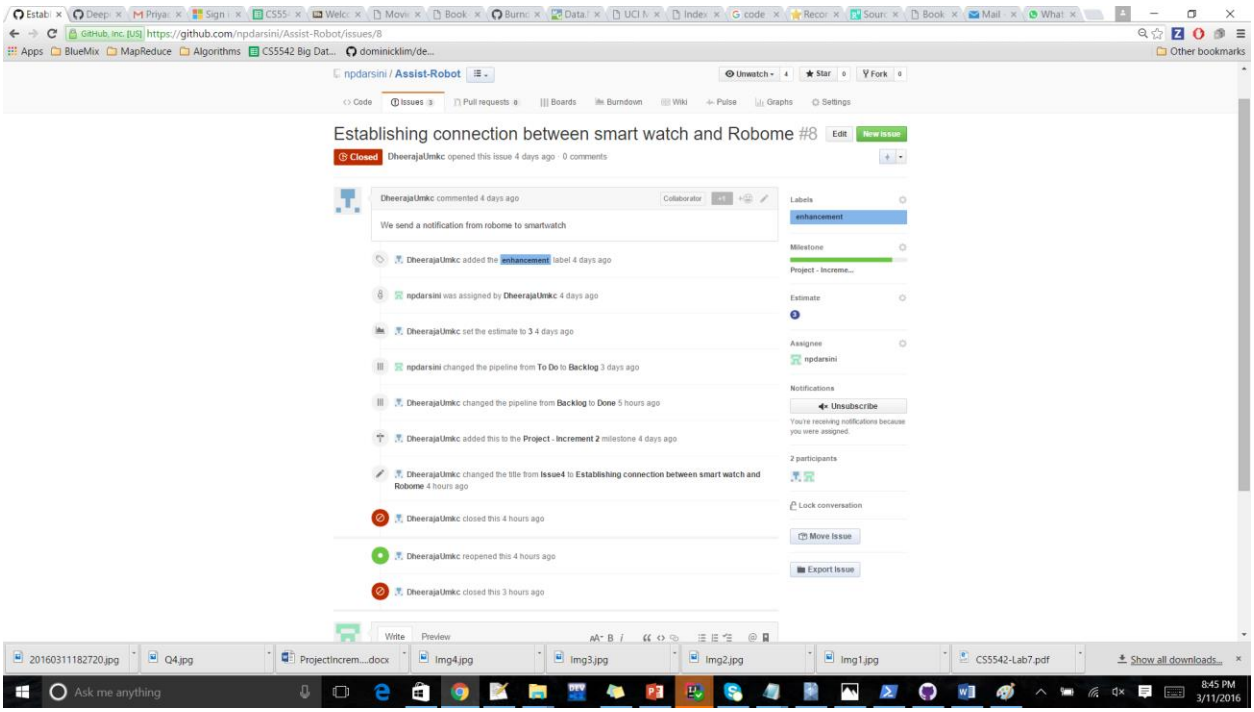
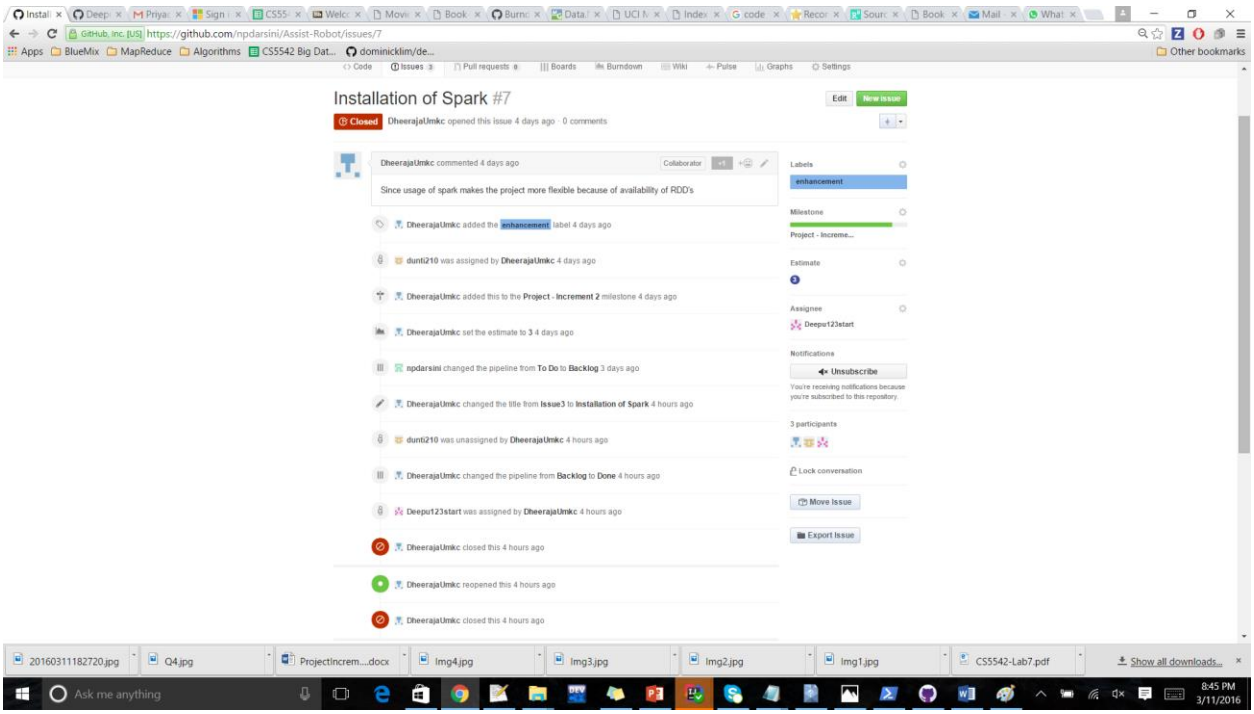
Q4.jpg
ProjectIncrem....docx
Img4.jpg
Img3.jpg
Img2.jpg
Img1.jpg
CS5542-Lab7.pdf
Show all downloads...
Ask me anything
8:47 PM
3/11/2016


https://github.com/npdarsini/Assist-Robot/issues/9
Data Collection and analysis #9
Edit
New issue
Closed
DheerajaUmkc opened this issue 4 days ago · 0 comments
DheerajaUmkc commented 4 days ago
Collaborator
Collection of data related to project, analyzing it and making it useful to the project
DheerajaUmkc added this to the Project - Increment 2 milestone 4 days ago
DheerajaUmkc added the enhancement label 4 days ago
DheerajaUmkc set the estimate to 3 4 days ago
DheerajaUmkc changed the pipeline from New Issues to In Progress 4 hours ago
DheerajaUmkc changed the estimate from 3 to 5 4 hours ago
npdarsini was assigned by DheerajaUmkc 4 hours ago
DheerajaUmkc closed this 4 hours ago
DheerajaUmkc reopened this 4 hours ago
DheerajaUmkc changed the title from Issue5 to Data Collection and analysis 4 hours ago
DheerajaUmkc changed the estimate from 5 to 3 4 hours ago
DheerajaUmkc changed the estimate from 3 to 5 4 hours ago
DheerajaUmkc changed the estimate from 5 to 3 4 hours ago
DheerajaUmkc closed this 3 hours ago
Labels
enhancement
Milestone
Project - Increme...
Estimate
Assignee
npdarsini
Notifications
Unsubscribe
You're receiving notifications because you were assigned.
2 participants
Lock conversation
Move Issue
Export Issue
20160311182720.jpg
Q4.jpg
ProjectIncrem....docx
Img4.jpg
Img3.jpg
Img2.jpg
Img1.jpg
CS5542-Lab7.pdf
Show all downloads...
Ask me anything
8:46 PM
3/11/2016


https://github.com/npdarsini/Assist-Robot/issues/8
npdarsini / Assist-Robot
Unwatch
Star
Fork
Code
Issues
Pull requests
Boards
Burndown
Wiki
Pulse
Graphs
Settings
Establishing connection between smart watch and Robome #8
Edit
New issue
Closed
DheerajaUmkc opened this issue 4 days ago · 0 comments
DheerajaUmkc commented 4 days ago
Collaborator
We send a notification from robome to smartwatch
DheerajaUmkc added the enhancement label 4 days ago
npdarsini was assigned by DheerajaUmkc 4 days ago
DheerajaUmkc set the estimate to 3 4 days ago
npdarsini changed the pipeline from To Do to Backlog 3 days ago
DheerajaUmkc changed the pipeline from Backlog to Done 5 hours ago
DheerajaUmkc added this to the Project - Increment 2 milestone 4 days ago
DheerajaUmkc changed the title from Issue4 to Establishing connection between smart watch and Robome 4 hours ago
DheerajaUmkc closed this 4 hours ago
DheerajaUmkc reopened this 4 hours ago
DheerajaUmkc closed this 3 hours ago
Write
Preview
Labels
enhancement
Milestone
Project - Increme...
Estimate
Assignee
npdarsini
Notifications
Unsubscribe
You're receiving notifications because you were assigned.
2 participants
Lock conversation
Move Issue
Export Issue
20160311182720.jpg
Q4.jpg
ProjectIncrem....docx
Img4.jpg
Img3.jpg
Img2.jpg
Img1.jpg
CS5542-Lab7.pdf
Show all downloads...
Ask me anything
8:45 PM
3/11/2016


https://github.com/npdarsini/Assist-Robot/issues/7
Installation of Spark #7
Closed
DheerajaUmkc opened this issue 4 days ago · 0 comments
DheerajaUmkc commented 4 days ago
Since usage of spark makes the project more flexible because of availability of RDD's
DheerajaUmkc added the enhancement label 4 days ago
dunti210 was assigned by DheerajaUmkc 4 days ago
DheerajaUmkc added this to the Project - Increment 2 milestone 4 days ago
DheerajaUmkc set the estimate to 3 4 days ago
npdarsini changed the pipeline from To Do to Backlog 3 days ago
DheerajaUmkc changed the title from Issue3 to Installation of Spark 4 hours ago
dunti210 was unassigned by DheerajaUmkc 4 hours ago
DheerajaUmkc changed the pipeline from Backlog to Done 4 hours ago
Deeput123start was assigned by DheerajaUmkc 4 hours ago
DheerajaUmkc closed this 4 hours ago
DheerajaUmkc reopened this 4 hours ago
DheerajaUmkc closed this 4 hours ago
Edit
New issue
Labels
enhancement
Milestone
Project - Increme...
Estimate
Assignee
Deeput123start
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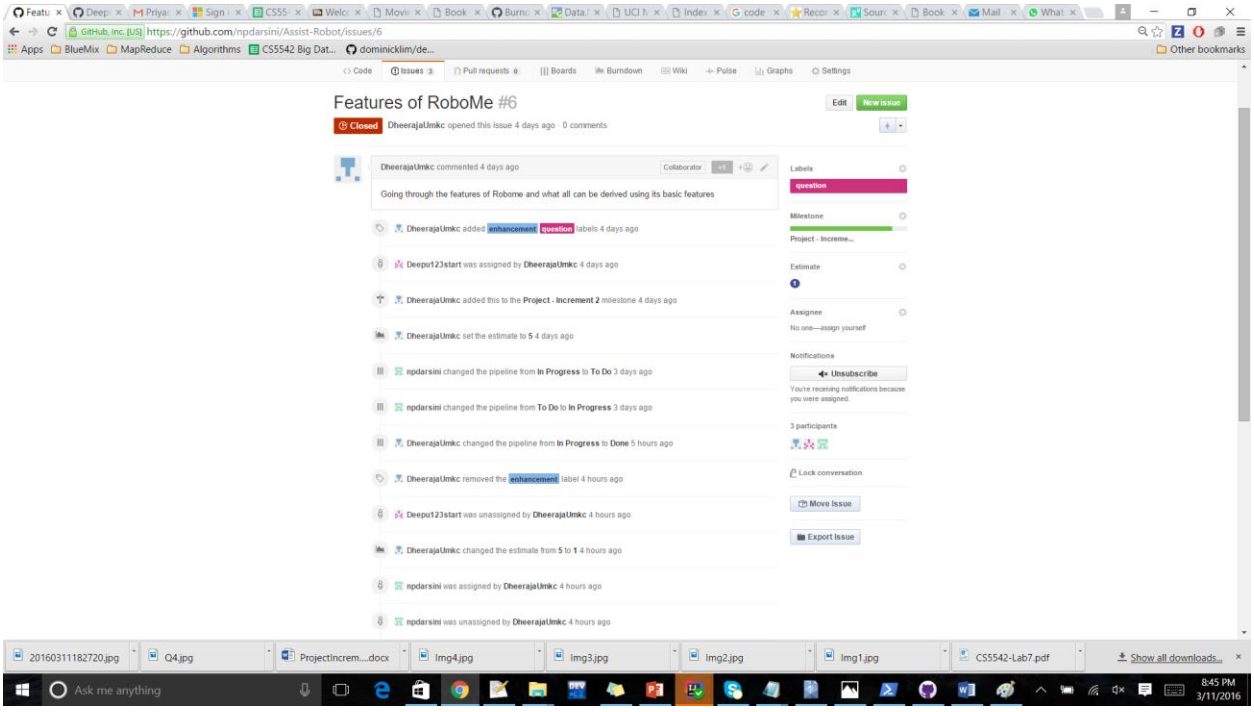
https://github.com/npdarsini/Assist-Robot/issues/6
Features of RoboMe #6
Closed
DheerajaUmkc opened this issue 4 days ago · 0 comments
DheerajaUmkc commented 4 days ago
Going through the features of Robome and what all can be derived using its basic features
DheerajaUmkc added enhancement question labels 4 days ago
Deeput123start was assigned by DheerajaUmkc 4 days ago
DheerajaUmkc added this to the Project - Increment 2 milestone 4 days ago
DheerajaUmkc set the estimate to 5 4 days ago
npdarsini changed the pipeline from In Progress to To Do 3 days ago
npdarsini changed the pipeline from To Do to In Progress 3 days ago
DheerajaUmkc changed the pipeline from In Progress to Done 5 hours ago
DheerajaUmkc removed the enhancement label 4 hours ago
Deeput123start was unassigned by DheerajaUmkc 4 hours ago
DheerajaUmkc changed the estimate from 5 to 1 4 hours ago
npdarsini was assigned by DheerajaUmkc 4 hours ago
npdarsini was unassigned by DheerajaUmkc 4 hours ago
Edit
New issue
Labels
question
Milestone
Project - Increme...
Estimate
Assignee
No one—assign yourself
Notifications
Unsubscribe
You're receiving notifications because you were assigned.
3 participants
Lock conversation
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20160311182720.jpg
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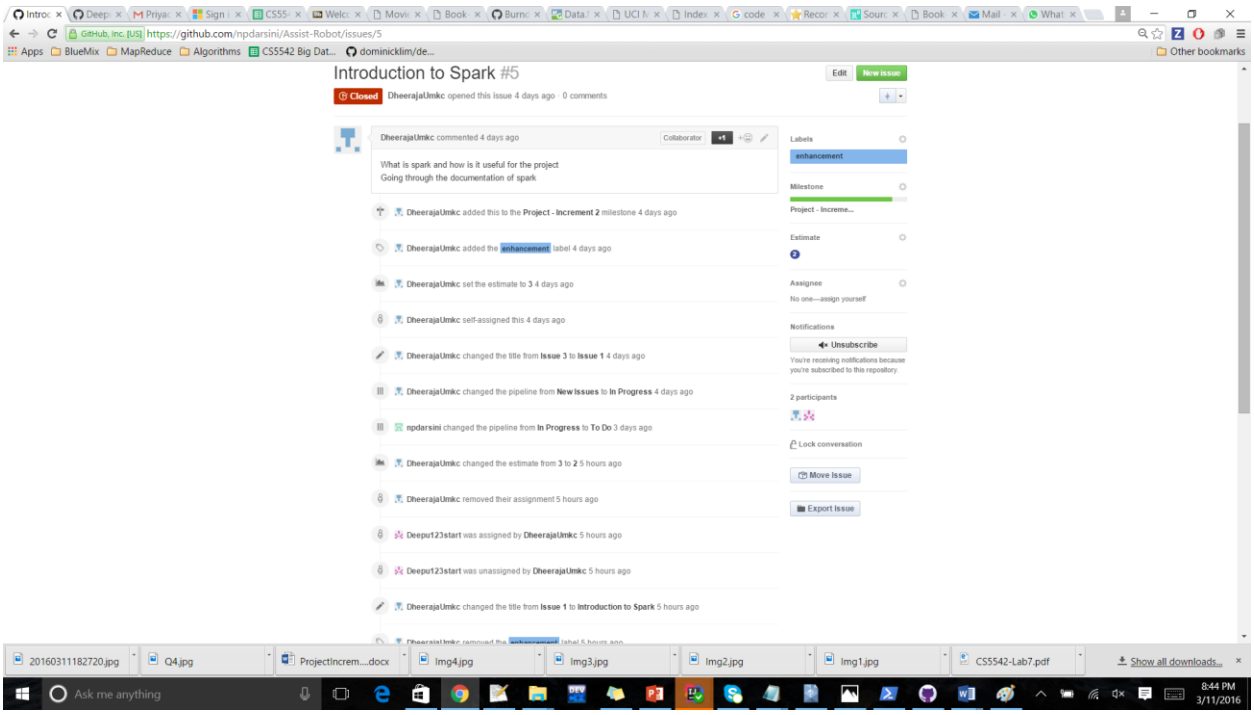

Bibliography:

Lab Tutorials and the material provided by Dr. Lee.