San Jose State University
Computer Engineering Department

CMPE 287 - Software Quality Assurance and Testing

Mobile Application Testing with AI Features (Envision AI)

Project Team - 9

Submitted To: Dr. Jerry Zeyu Gao

Submitted By:

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1. Introduction

The way technology has changed our lives has become quite evident from the last couple of decades and it continues to grow with each passing day. Amid this, Artificial Intelligence(AI) has become one of the most rapidly accepted and used technologies all around the globe. Undoubtedly, SIRIs and Alexa have made our lives easy. However, use of AI is not limited to just that. If we look around, we can see a lot of applications that implement and use Image recognition for AI Advancement. One such application is the Envision AI application. Envision
Helps blind people and makes their everyday life easier by helping them carry out the tasks like reading newspapers to identify people.
Image Recognition is the ability of a machine or a software to recognize a particular thing or an activity.

In this project, We will test the Envision AI application, which will for the most part center around testing the AI part of the Application.

1.1 Mobile App information

Envision AI:
Envision AI Application Google Playstore Download link:
https://play.google.com/store/apps/details?id=com.letsenvision.envisionai&hl=en_US
Envision AI application is developed to make the lives of people with Visual Impairment easy.
It offers the following features and functionalities:

• Read In a split second - Read message in a split second in more than 60 distinct dialects. Accessible completely disconnected for latin-based dialects like English.

• Read reports - Output records with one or various pages without a moment's delay, with the assistance of Envision in confining the archive.
• Read Handwriting - Read written by hand postcards, letters, records or any perfect penmanship.
• Depict Scenes - Portrays any scene around you with precision.
• Scan Barcodes - Scan scanner tags effectively and get more data about items.
• Recognize Colors - Discover the shade of garments and items around you without any hurdles.
• Show Envision - Train Envision to perceive your loved ones while depicting scenes.
• Envision everything - Offer with Envision any record you need to get to! Just, select the record or photograph from your telephone file or while on another application, tap share and select "Envision", to get to anything, whenever.

1.2 Test Information

The objective of this testing project is to develop test cases to test the AI based mobile applications. We're going to dive into different testing techniques and to test the System functionality against the System requirements.
The Primary objectives of our Project are:

1. Find out AI and Non-AI functional requirements of the application.
2. Design test cases for the given functional requirements.
3. Assess system quality using test cases.
4. Analyze results and make comments about the same.
5. Pick appropriate test models and tools for our Project.

1.3 Task Partition

Team Member	**Task**
Noopur Mehta	Research about Application and features, Decide scope for the functional testing
Mitra Nayak	Test result analysis, Cost, complexity and coverage

	analysis
Bhumika Tiwari	Test case design and optimization
Atharva Munshi	Project scheduling, Test models and methods

1.4 Project Schedule

Time	**Description**
January 31 - February 20	Project Initiation and Research
February 20 - March 25	Deliverable 1 - Conventional Test Report Select Test case models, methods and Design Test cases.
March 26 - April 10	Deliverable 2 - AI Test Report Select AI Test Methods, Models and Design AI Test Cases, Reiterate the conventional testing methods and make necessary changes if required.
April 11 - April 24	Deliverable 3 - Test Automation Document Execute all the test cases, analyse and report the results.
April 25 - May 7	Final Project Presentation and Demo
May 8 - May 10	Deliverable 4 - Project Final Package Revisit the entire process, report the probable improvements and accomplishments.

2. Test Requirements

2.1 Download and Installation

You can find the links to download the Envision AI Application for Apple and Android below.

Envision AI Play store download Link:

https://play.google.com/store/apps/details?id=com.letsenvision.envisionai&hl=en_US

Envision AI Apple store download Link:

https://itunes.apple.com/us/app/envision-ai/id1268632314?mt=8

2.2 Scope of Function Testing

A type of Software testing where the Software is tested with the use of System requirement specification document is called Functional Testing. Functional testing is the most basic type of testing and it checks whether the system consists of all the features that it is expected to. One important thing to remember is that Functional testing doesn't focus on "How" to achieve the final objective i.e. it isn't concerned about the process, rather, with the final outcome of that process.

2.2.1 AI Function Requirements

1. Identifying Objects
2. Detect the color of a particular thing
3. Read the texts (Real time)
4. Read the texts from an image
5. Read the handwritten notes

2.2.2 Non-AI Functional Requirements:

1. Sign-in feature
2. Capture photos
3. WiFi/Mobile data detection
4. Permission tabs(Camera and Map)
5. Image Store
6. Upload image

2.3 Scope of Function Testing

2.3.1 Building the Analysis Model

Analysis model is the bridge between requirement specification and design modelling phase. As mentioned in the below figure, there are a total four components of Analysis Model.

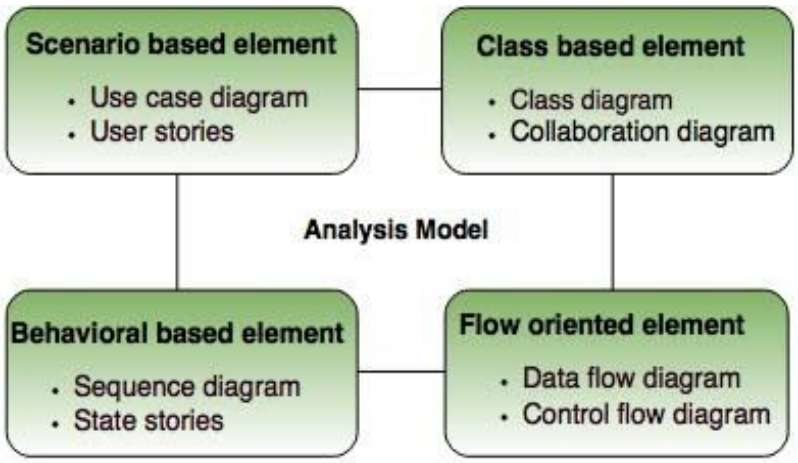


Fig. - Elements of analysis model

2.3.1.1 Scenario based element

Scenario based element is used to depict how the user interacts with the System. The final product is the sequence of activities carried out when the System is used.
Methods used:

Use case diagram
User Stories

Sample Use Case for our Project:

Use Case: Read Handwriting
Actor: Visually impaired User
Description: Open Envision AI Mobile application; Hold the phone still in front of the handwritten note or letter to read it.

Use Case: Recognize the color
Actor: Visually impaired User
Description: Open Envision AI Mobile application; Hold the phone in front of the object or an item that you want to recognize the color of.

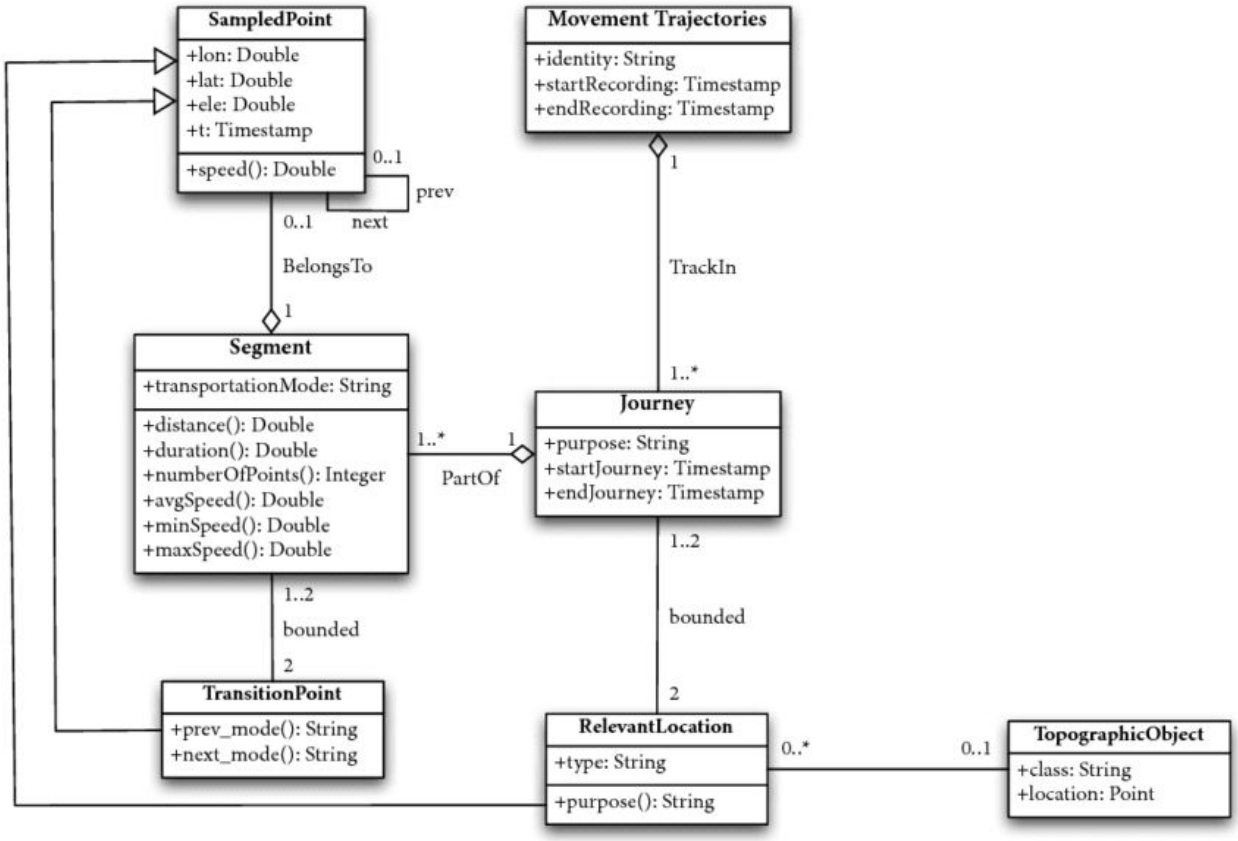
2.3.1.2 Class based element

Class based elements are used to describe the objects that the system will manipulate.

Methods used:

Class diagram
Collaboration diagram

Sample Class Diagram:



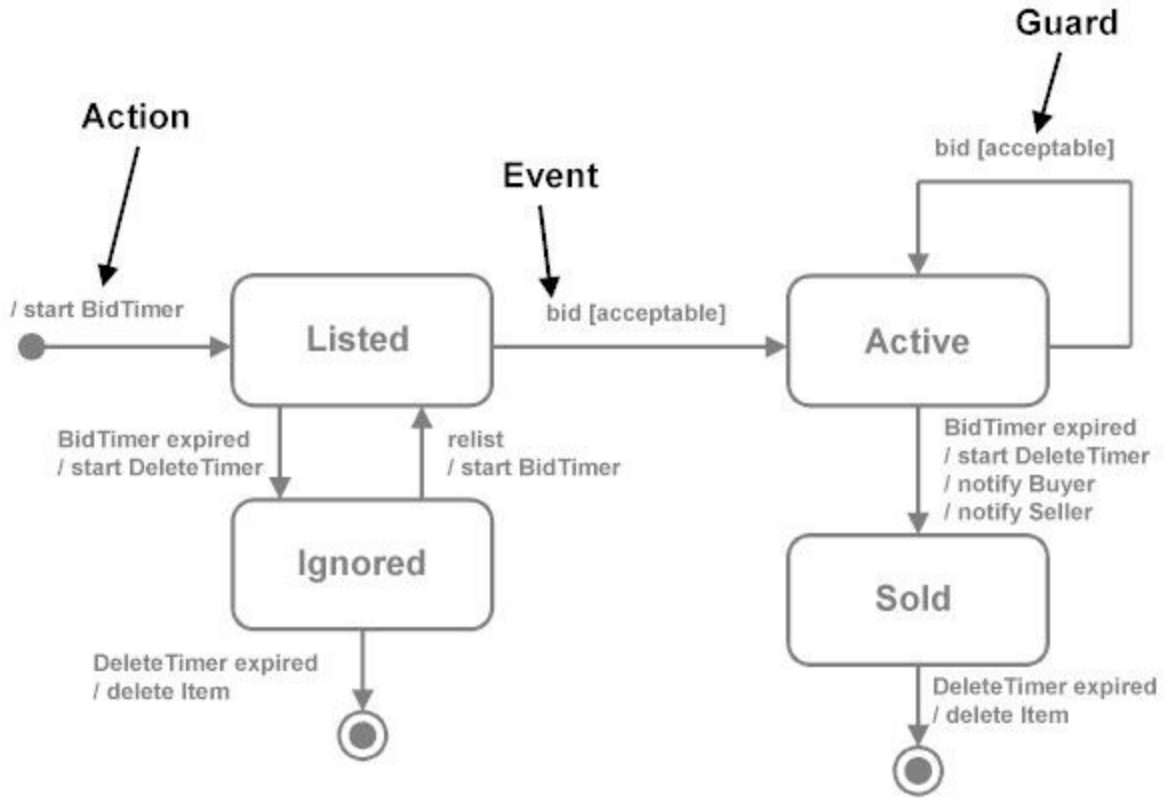
2.3.1.3 Behavioral based element

Behavioral based elements are used to show the external events that change the state of the System or the classes.

Methods used:

Sequence Diagram
State Diagram

Sample State Diagram/High level Scenario Diagram:



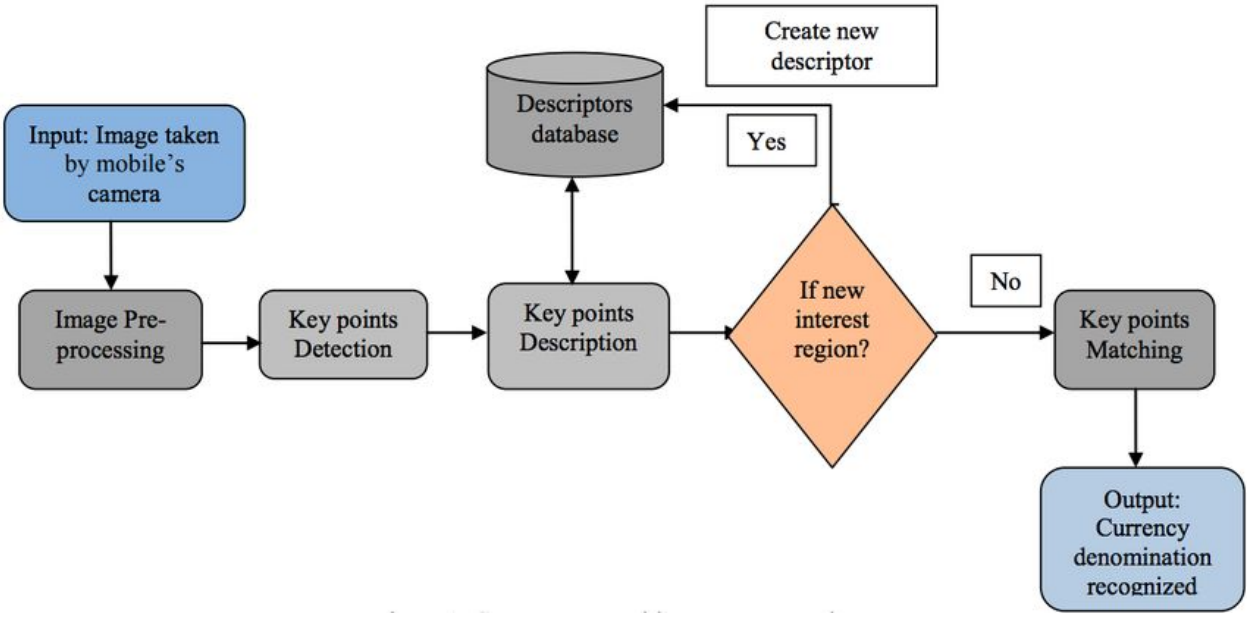
2.3.1.4 Flow oriented element

Flow oriented element is used to show the data and control flow inside the system.

Methods used:

Data flow diagram
Control flow diagram

Sample Control flow diagram for our project for object detection and recognition:



3.Selected Conventional Test Models and Methods

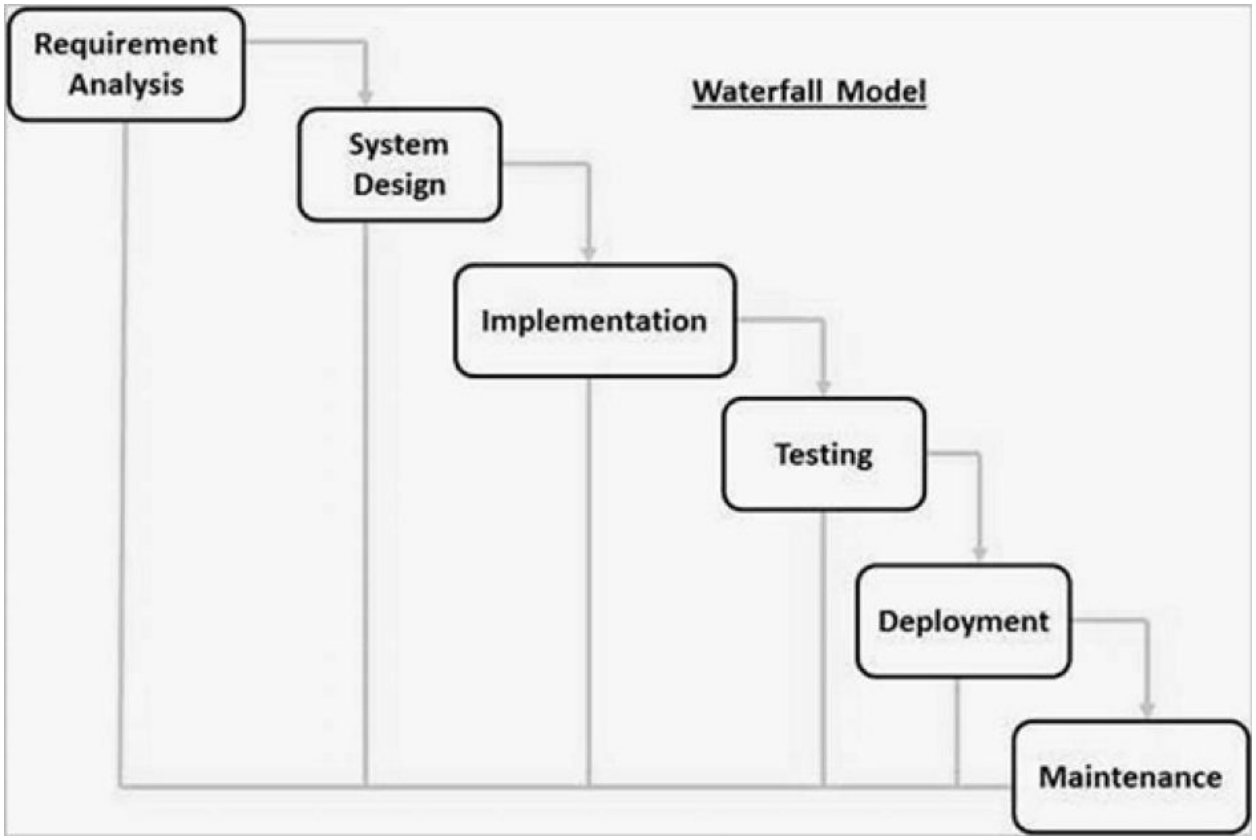
3.1 Selected Test Model

One of the core parts of SDLC is the test models. In order to develop a software, different models are used. There are several pros and cons of each model. Thus. If we should select a particular model or not completely depends on the type of project as well as the given requirements of that project.

After going through different models, we decided to use the waterfall model for our project. The reason this model benefits our project is that there is no connection and dependency in the development process. Apart from that, we have decided to perform the testing of our project independently.

The phases of the model are:

1. Req gathering and analysis
2. Design the Tests (System design)
3. Implementation
4. Execute the Tests
5. Deployment
6. Maintenance



The testing which will be done by taking this model into consideration will be a linear process. There will be a minimum amount of feedback loop. This loop is generated because the problems found because of the test failures should be fixed.

The pros and cons of using this model are as follows:

Pros:

- It is not complicated and is easily understandable.
- Less time is required for the later phases if the initial phase is performed properly.
- Testing is performed at the end of every phase.

Cons:

- The requirements are not changeable, and we cannot go back to previous phase in order to make the changes
- In order to start the next phase, the current phase should be completed.

3.2 Selected Test Method

We have decided to use black box testing.
In black box testing, the internal working of the program is not taken into consideration. More weightage is given to inputs and outputs.
The functions of the code are tested.
The knowledge of how the implementation is done or how the code is internally wired is not required.

There are different types of black box testing:

1. Functional testing
2. Non-functional testing
3. Regression Testing

As the name suggests, functional testing tests the functions of the program
In case of Non-functional testing, testing is done on the maintainability, usability, scalability, etc.
Regression testing is done when we need to check the maintenance of the code.

There are different methods of black box testing:

1. Category Partition Testing
2. State Transition Testing
3. Decision Table Testing
4. Boundary Value Testing
5. Equivalence Partitioning Testing
6. Scenario Testing

We can note the test coverage for all of the above methods and know the coverage of the tests.

4. Test case design with test data

Prerequisites for Envision AI App

iOS
Version: 2.1.7
Compatibility: Requires iOS 10.0 or later. Compatible with iPhone, iPad, and iPod touch.
Size: 250 MB
Languages: English, Arabic, Czech, Dutch, French, German, Greek, Hebrew, Hindi, Italian, Japanese, Polish, Portuguese, Russian, Simplified Chinese, Spanish, Swedish, Thai, Traditional Chinese, Turkish, Ukrainian, Vietnamese

Android
Version: 1.3.7
Compatibility: Android 5.0 and up
Size: Varies with device

4.1 Decision Table – Envision Login

Test Case ID: EN_001
Wrote By: Bhumika Tiwari
Documented Date: 21 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description: User enters his/her credentials to be able to login to Envision app.

Pre-conditions: Envision AI app needs to be installed on test devices.

Expected output data and/or events: Login should be successful with valid credentials only.

Decision Table :	**R1**	**R2**	**R3**	**R4**
C1 : Internet/ Wifi is on	**T**	**T**	**F**	**F**
C2 : Valid credentials are fed	**T**	**F**	**T**	**F**
A1 : Successful Login	**X**			
A2 : Unsuccessful Login		**X**	**X**	**X**

4.2 Decision Table – 'Instant' Text/Document Identification

Test Case ID: EN_002
Wrote By: Bhumika Tiwari
Documented Date: 21 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'Text' tab of the Envision app on the top right of the screen.
b) User clicks the 'Instant' option at the left bottom of the screen.
c) User focuses the mobile camera on a piece of text. The text can be handwritten as well.

Pre-conditions:

a) Envision AI needs to be installed on the device
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app should detect the text in focus correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**	**R5**
C1 : Language Text	**T**	**T**	**T**	**T**	**F**

C2 : Object	**T**	**T**	**F**	**F**	**T**
C3 : Handwritten text	**T**	**F**	**T**	**F**	**F**
A1 : Text found	**X**	**X**	**X**	**X**	
A2 : Text not found					**X**

4.3 Decision Table – Read Multiple Pages

Test Case ID: EN_003
Wrote By: Mitra Nayak
Documented Date: 21 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) Users click on "Text" and then click on "More".
b) User focuses on multiple pages that he/she wants to be read by the app.

Pre-conditions:

a) Envision AI needs to be installed on the device
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app should detect the text in document correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**
C1 : Multiple Page	**T**	**T**	**T**	**T**	**F**	**F**	**F**	**F**
C2 :	**T**	**T**	**F**	**F**	**T**	**T**	**F**	**F**

Language Text								
C3 : Object	**T**	**F**	**T**	**F**	**T**	**F**	**T**	**F**
A1 : Text Detection	**X**	**X**			**X**	**X**		
A2 : No Text Found			**X**	**X**			**X**	**X**

4.4 Decision Table – Import PDF for Text Detection

Test Case ID: EN_004
Wrote By: Bhumika Tiwari
Documented Date: 22 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'Text' tab of the Envision app on the top right of the screen.
b) User clicks on the 'More' option at the right bottom of the screen.
c) User clicks on 'Import PDF'.
d) User selects a PDF document.

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app should detect the text correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**
C1 : Uploaded document	**T**	**T**	**F**	**F**

has text				
C2 : Wifi/Internet Access	**T**	**F**	**T**	**F**
A1 : Text Found	**X**			
A2 : No Text Found			**X**	
A2 : Unable to Process		**X**		**X**

4.5 Decision Table – Import Image for Text Identification

Test Case ID: EN_005
Wrote By: Bhumika Tiwari
Documented Date: 22 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'Text' tab of the Envision app on the top right of the screen.
b) User clicks on the 'More' option at the right bottom of the screen.
c) User clicks on 'Import Image'.
d) User selects an image.

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app detects the text correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**
C1 : Uploaded image has text	**T**	**T**	**F**	**F**
C2 : Wifi/Internet	**T**	**F**	**T**	**F**

present				
A1 : Text Found	**X**			
A2 : Text Not Found			**X**	
A3 : Unable to process		**X**		**X**

4.6 Decision Table – Describe Scene for Objects Identification

Test Case ID: EN_006
Wrote By: Bhumika Tiwari
Documented Date: 23 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'General' tab of the Envision app on the top right of the screen.
b) User clicks on the 'Describe Scene' option.

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app should describe the objects in the scene correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**
C1 : Wifi/internet access	**T**	**T**	**T**	**T**	**F**	**F**	**F**	**F**

C2 : Natural lighting conditions	**T**	**T**	**F**	**F**	**T**	**T**	**F**	**F**
C3 : Multiple objects in focus	**T**	**F**	**T**	**F**	**T**	**F**	**T**	**F**
A1 : Scene detection done	**X**	**X**	**X**	**X**				
A2 : Unable to process					**X**	**X**	**X**	**X**

4.7 Decision Table – Detect Colors

Test Case ID: EN_007
Wrote By: Bhumika Tiwari
Documented Date: 22 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'General' tab of the Envision app on the top
b) Clicks on "Detect Colors"

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app detects the text correctly.

Decision Table :	**R1**	**R2**
C1 : Color Detection	**T**	**T**

C2 : Wifi/Internet present	**T**	**F**
A1 : Color Detected	**X**	
A2 : Unable to process		**X**

4.8 Decision Table – Scan Barcode

Test Case ID: EN_008
Wrote By: Bhumika Tiwari
Documented Date: 22 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'General' tab of the Envision app on the top
b) User clicks on 'Scan Barcode'.

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.

Expected output data and/or events: Envision app scans the barcode correctly..

Decision Table :	**R1**	**R2**
C1 : Color Detection	**T**	**T**
C2 : Wifi/Internet present	**T**	**F**
A1 : Color Detected	**X**	**X**

4.9 Decision Table – Teach Envision

Test Case ID: EN_006
Wrote By: Bhumika Tiwari

Documented Date: 23 March 2020
Test Type: Conventional Testing
Product Name: Envision AI
Release and Version No.: 1

Test case description:

a) User clicks on the 'General' tab of the Envision app on the top right of the screen.
b) User clicks on the 'Describe Scene' option at the right bottom of the screen.

Pre-conditions:

a) Envision AI needs to be installed on the device.
b) Successful user login to Envision app should be done.
c) Envision app should be trained for a face using below steps:
    - User clicks on the 'General' tab of the Envision app on the top right of the screen.
    - User clicks on the 'Teach Envision' option at the right bottom of the screen.
    - User clicks 'Teach a face'.
    - Click on the round icon at the center to click 5 photos for the face to be saved in the app library.

Expected output data and/or events: Envision app should identify the face in scene correctly.

Decision Table :	**R1**	**R2**	**R3**	**R4**
C1 : Wifi/Internet present	**T**	**T**	**F**	**F**
C2 : Face in scene same as saved	**T**	**F**	**T**	**F**
A1 : Person detected	**X**			
A2 : Person not detected		**X**		
A3: No internet found			**X**	**X**

4.10 Test Cases

Test Case#	Test Steps	Expected Results	Test Case Status	Actual Results
E_01	Step 1: Connect test mobile device to working Wifi network. Step 2: Enter valid credentials for Envision app.	Login to Envision app should be successful.	Passed	Login to Envision app is successful.
E_02	Step 1: Connect test mobile device to working Wifi network. Step 2: Enter invalid credentials for Envision app.	Login to the Envision app should fail.	Passed	Login to Envision app fails.
E_03	Step 1: Disconnect test mobile device from any working Wifi network. Step 2: Enter valid credentials for Envision app.	Login to the Envision app should fail.	Passed	Login to Envision app fails.
E_04	Step 1: Disconnect test mobile device from any working Wifi network. Step 2: Enter invalid credentials for Envision app.	Login to the Envision app should fail.	Passed	Login to Envision app fails.

E_05	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Instant’ option at the left bottom of the screen. Step 4: User focuses the mobile camera such that language text, non textual content and handwritten text are all in focus.	The Envision app should detect all the text available in any of the acceptable language(s).	Failed	Hindi handwritten text is not getting detected by the app whereas English handwritten as well as printed texts are getting identified correctly.
E_06	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Instant’ option at the left bottom of the screen. Step 4: User focuses the mobile camera such that language text and non-textual content	The Envision app should detect all the text available in any of the acceptable language(s).	Passed	Envision app detects all the text available in any of the acceptable language(s).

	are in focus.			
E_07	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Instant’ option at the left bottom of the screen. Step 4: User focuses the mobile camera such that language text and handwritten text are in focus.	The Envision app should detect all the text available in any of the acceptable language(s).	Failed	Hindi handwritten text is not getting detected by the app whereas English handwritten as well as printed texts are getting identified correctly.
E_08	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Instant’ option at the left bottom of the screen. Step 4: User focuses the mobile camera such that language text is in	The Envision app should detect all the text available in any of the acceptable language(s).	Passed	Envision app detects all the text available in any of the acceptable language(s).

	focus.			
E_9	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Instant’ option at the left bottom of the screen. Step 4: User focuses the mobile camera such that only non-textual content is in focus.	The Envision app should give the response ‘Text not found’.	Passed	Envision app gives the response of ‘Text not found’.
E_10	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the ‘More’ option at the left bottom of the screen. Step 4: User clicks on ‘Read Multiple Pages’ option. Step 5: User focuses the mobile	The Envision app should identify all text elements in all the pages in focus and give the response ‘Text not found’ for all pages with no text content.	Passed	The Envision app identifies all text elements in all the pages in focus and gives a response ‘Text not found’ for all pages with no text content.

	camera for multiple pages which include language text as well as non-textual content in focus.			
E_11	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'More' option at the left bottom of the screen. Step 4: User clicks on 'Read Multiple Pages' option. Step 5: User focuses the mobile camera for multiple pages which include language text only in focus.	The Envision app should identify all text elements in all the pages in focus.	Passed	Envision app identifies all text elements in all the pages in focus.
E_12	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen.	The Envision app should give the response 'Text not found' for all pages.	Passed	The Envision app gives a response 'Text not found' for all pages.

	Step 3: User clicks the ‘More’ option at the left bottom of the screen. Step 4: User clicks on ‘Read Multiple Pages’ option. Step 5: User focuses the mobile camera for multiple pages which include no text but only non-textual content in focus.			
E_13	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen. Step 3: User clicks the ‘More’ option at the left bottom of the screen. Step 4: User clicks on ‘Read Multiple Pages’ option. Step 5: User focuses the mobile camera for multiple pages which include blank pages in focus.	The Envision app should give the response ‘Text not found’ for all pages.	Passed	Envision app gives a response ‘Text not found’ for all pages.

E_14	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'More' option at the left bottom of the screen. Step 4: User clicks on 'Read Multiple Pages' option. Step 5: User focuses the mobile camera for a single page which includes language text and non-textual content in focus.	The Envision app should identify all text elements in the page.	Passed	The Envision app identifies all text elements in all the pages.
E_15	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'More' option at the left bottom of the screen. Step 4: User clicks on 'Read Multiple	The Envision app should identify all text elements in the page.	Passed	The Envision app identifies all text elements in all the pages.

	Pages' option. Step 5: User focuses the mobile camera for a single page which includes only language text in focus.			
E_16	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'More' option at the left bottom of the screen. Step 4: User clicks on 'Read Multiple Pages' option. Step 5: User focuses the mobile camera for a single page which includes only non-textual content in focus.	The Envision app should give the response 'Text not found'.	Passed	Envision app gives response 'Text not found'.
E_17	Step 1: User logins to Envision AI app successfully. Step 2: User clicks on the 'Text' tab of	The Envision app should give the response 'Text not found'.	Passed	Envision app gives response 'Text not found'.

	the Envision app on the top right of the screen. Step 3: User clicks the 'More' option at the left bottom of the screen. Step 4: User clicks on 'Read Multiple Pages' option. Step 5: User focuses the mobile camera for a single page which includes only blank pages in focus.			
E_18	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then, 'More' option. Step 3: User clicks the 'Import PDF' option. Step 4: User selects a PDF document with language text content.	The Envision app should identify all text elements in the PDF.	Passed	The Envision app identifies all text elements in all the pages.

E_19	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then, 'More' option. Step 3: User clicks the 'Import PDF' option. Step 4: User selects a PDF document with language text content.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.
E_20	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then, 'More' option. Step 3: User clicks the 'Import PDF' option.	The Envision app should give the response 'Text not found'.	Failed	The Envision app gives some random text as a response.

	Step 4: User selects a PDF document with non-textual content.			
E_21	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then, 'More' option. Step 3: User clicks the 'Import PDF' option. Step 4: User selects a PDF document with non- textual content.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.
E_22	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then,	The Envision app should identify all text elements in the image file.	Passed	Envision app identifies all text elements in the image file.

	'More' option. Step 3: User clicks the 'Import Image' option. Step 4: User selects an image file with textual content.			
E_23	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then, 'More' option. Step 3: User clicks the 'Import Image' option. Step 4: User selects an image file with textual content.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.
E_24	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'Text' tab of the Envision app on the top right of the screen and then,	The Envision app should give the response 'Text not found'.	Failed	The Envision app gives some random text as response during test execution sometimes. Test results inconsistent.

	‘More’ option. Step 3: User clicks the ‘Import Image’ option. Step 4: User selects an image file with non-textual content.			
E_25	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the ‘Text’ tab of the Envision app on the top right of the screen and then, ‘More’ option. Step 3: User clicks the ‘Import Image’ option. Step 4: User selects an image file with non-textual content.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.
E_26	Step 1: User logins to Envision AI app successfully and doesn’t lose Wifi access after this step. Step 2: User clicks on the ‘General’ tab of the Envision app	The Envision app should tell the color of the object under focus correctly.	Failed	The Envision app doesn’t predict the color of the object correctly sometimes. Inconsistent test results.

	on the top right of the screen. Step 3: User clicks the 'Detect Colors' option. Step 4: User focuses app camera on some object in good lighting conditions.			
E_27	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Detect Colors' option. Step 4: User focuses app camera on some object in good lighting conditions.	The Envision app should tell the color of the object under focus correctly.	Failed	The Envision app doesn't predict the color of the object correctly sometimes. Inconsistent test results.
E_28	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this	The Envision app should scan the barcode correctly and	Failed	The Envision app doesn't scan the barcode correctly

	step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Scan Barcode' option. Step 4: User focuses app camera on barcode.	identify the object to which barcode belongs.		sometimes. Inconsistent test results.
E_29	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks the 'Scan Barcode' option. Step 4: User focuses app camera on barcode.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.
E_30	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks	The Envision app should identify the person in the scene with the same name as saved in the	Passed	The Envision app identifies the person in the scene with the same name as saved in the Teach

	on the ‘General’ tab of the Envision app on the top right of the screen. Step 3: User clicks on the ‘Teach Envision’ option at the right bottom of the screen. Step 4: User clicks ‘Teach a face’. Step 5: Click on the round icon at the center to click 5 photos for the face to be saved in the app library. Step 6: User clicks on the ‘General’ tab of the Envision app on the top right of the screen. Step 7: User clicks on the ‘Describe Scene’ with the same person in the scene whose face has been used to Teach Envision app.	Teach Envision module.		Envision module.
E_31	Step 1: User logins to Envision AI app successfully and doesn’t lose Wifi access after this	The Envision app should not identify the person in the scene with the	Passed	The Envision app doesn’t identify the person in the scene with the

	step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Teach Envision' option at the right bottom of the screen. Step 4: User clicks 'Teach a face'. Step 5: Click on the round icon at the center to click 5 photos for the face to be saved in the app library. Step 6: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 7: User clicks on the 'Describe Scene' option with some other person in the scene whose face has not been used to Teach Envision app.	same name as saved in the Teach Envision module.		same name as saved in the Teach Envision module.
E_32	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step.	The Envision app should give a response that it is unable to	Passed	Envision app gives response that it is unable to process due to

	Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Teach Envision' option at the right bottom of the screen. Step 4: User clicks 'Teach a face'. Step 5: Click on the round icon at the center to click 5 photos for the face to be saved in the app library. Step 6: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 7: User clicks on the 'Describe Scene' option at the right bottom of the screen with the same person in the scene whose face has been used to Teach Envision app.	process due to internet connectivity issues.		internet connectivity issues.
E_33	Step 1: User logins to Envision AI app	The Envision app should	Passed	Envision app gives response

	successfully but loses Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Teach Envision' option at the right bottom of the screen. Step 4: User clicks 'Teach a face'. Step 5: Click on the round icon at the center to click 5 photos for the face to be saved in the app library. Step 6: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 7: User clicks on the 'Describe Scene' option with some other person in the scene whose face has not been used to Teach Envision app.	give a response that it is unable to process due to internet connectivity issues.		that it is unable to process due to internet connectivity issues.
E_34	Step 1: User logins	The Envision	Failed	The Envision

	to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Describe Scene'. Step 4: User focuses app camera on scene with multiple objects in natural lighting conditions.	app should identify the objects in the scene correctly.		app doesn't detect objects in the scene correctly every time. Test results inconsistent.
E_35	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Describe Scene'. Step 4: User focuses app camera on scene with single object in	The Envision app should identify the objects in the scene correctly.	Failed	The Envision app doesn't detect objects in the scene correctly every time. Test results inconsistent.

	natural lighting conditions.			
E_36	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Describe Scene'. Step 4: User focuses app camera on scene with multiple objects in conditions lacking natural light.	The Envision app should identify the objects in the scene correctly.	Failed	The Envision app doesn't detect objects in the scene correctly every time. Test results inconsistent.
E_37	Step 1: User logins to Envision AI app successfully and doesn't lose Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Describe Scene'. Step 4: User	The Envision app should identify the objects in the scene correctly.	Failed	The Envision app doesn't detect objects in the scene correctly every time. Test results inconsistent.

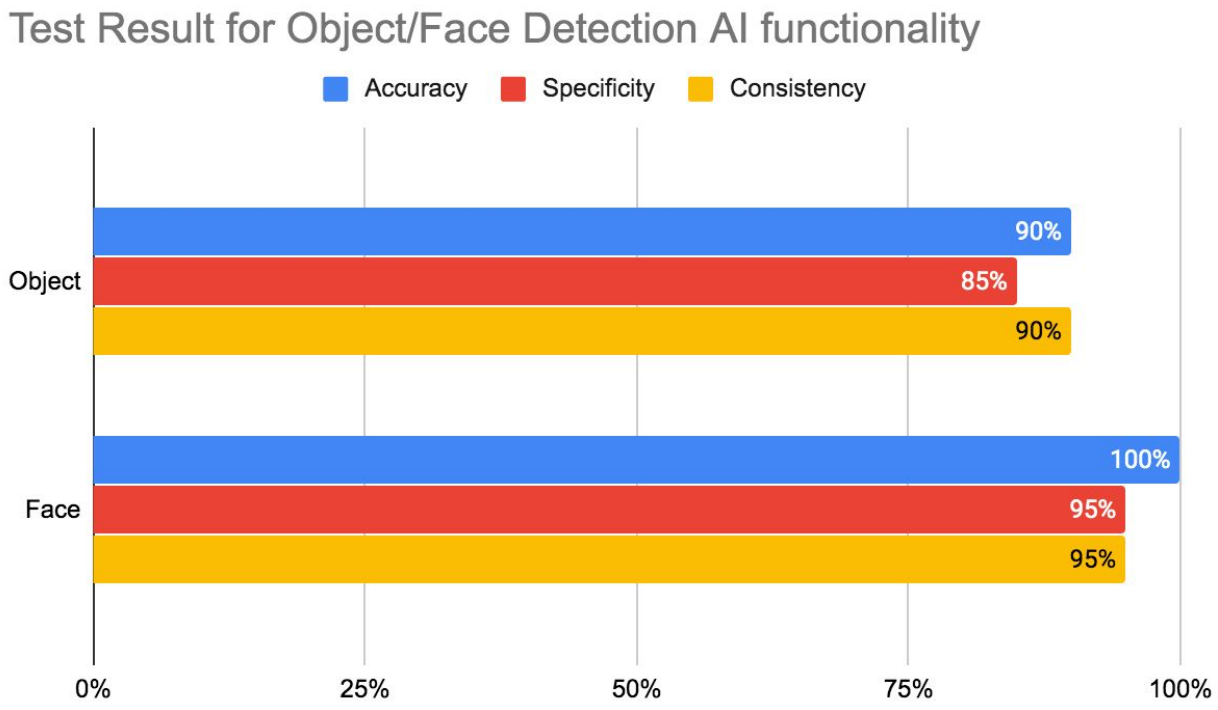
	focuses app camera on scene with single object in conditions lacking natural light.			
E_38	Step 1: User logins to Envision AI app successfully but loses Wifi access after this step. Step 2: User clicks on the 'General' tab of the Envision app on the top right of the screen. Step 3: User clicks on the 'Describe Scene'. Step 4: User focuses app camera on scene with multiple objects in natural lighting conditions.	The Envision app should give a response that it is unable to process due to internet connectivity issues.	Passed	Envision app gives response that it is unable to process due to internet connectivity issues.

5. Test result analysis and bug summary

5.1 Test Result Analysis

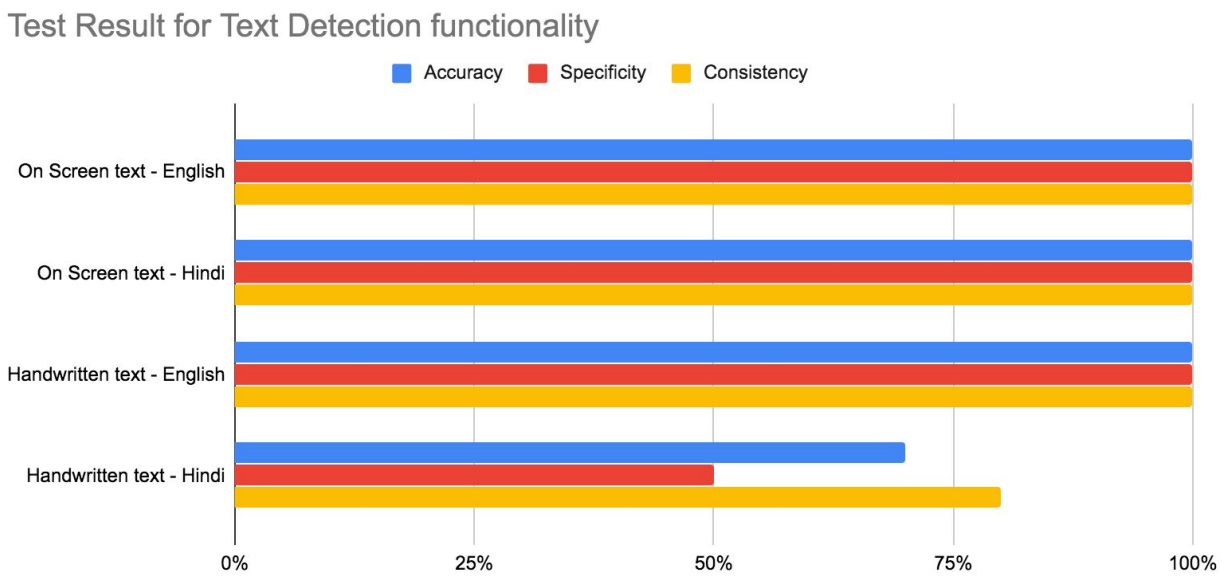
5.1.1 Test Result for Object/Face Detection AI functionality

	Accuracy	Specificity	Consistency
Object	**90%**	**85%**	**90%**
Face	**100%**	**95%**	**90%**



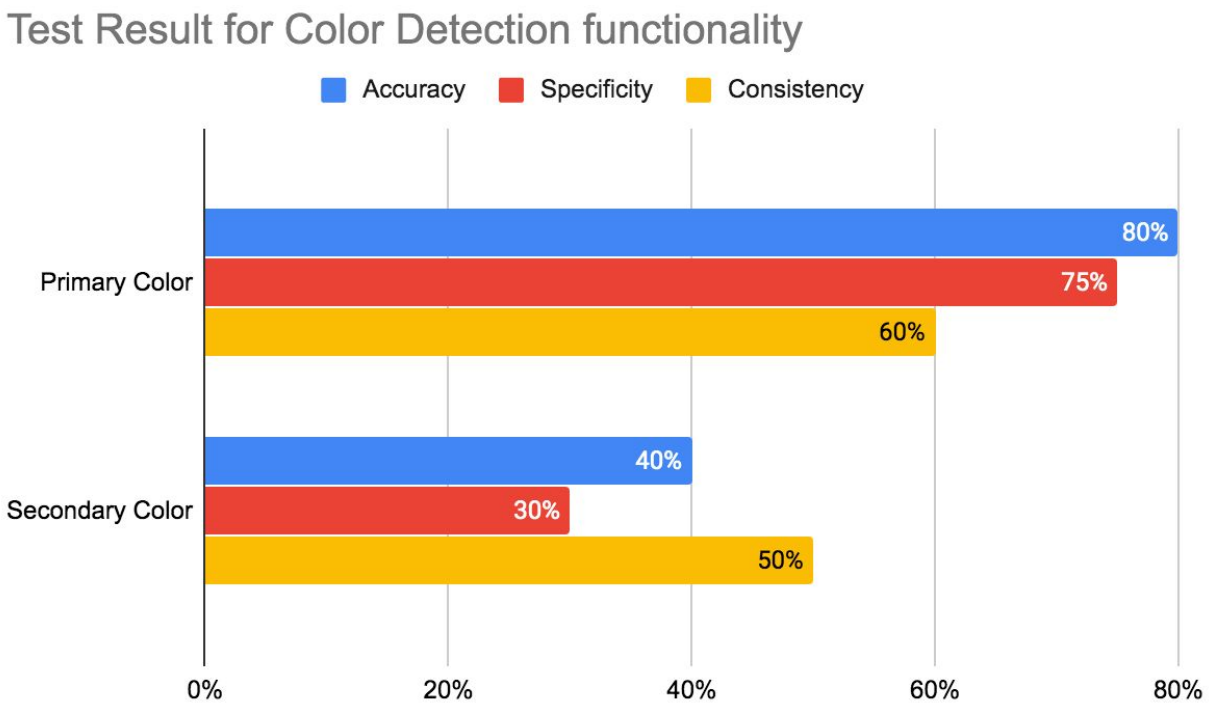
5.1.2 Test Result for Text Detection functionality

	Accuracy	Specificity	Consistency
On Screen text - English	100%	100%	100%
On Screen text - Hindi	100%	100%	100%
Handwritten text - English	100%	100%	100%
Handwritten text - Hindi	70%	50%	80%



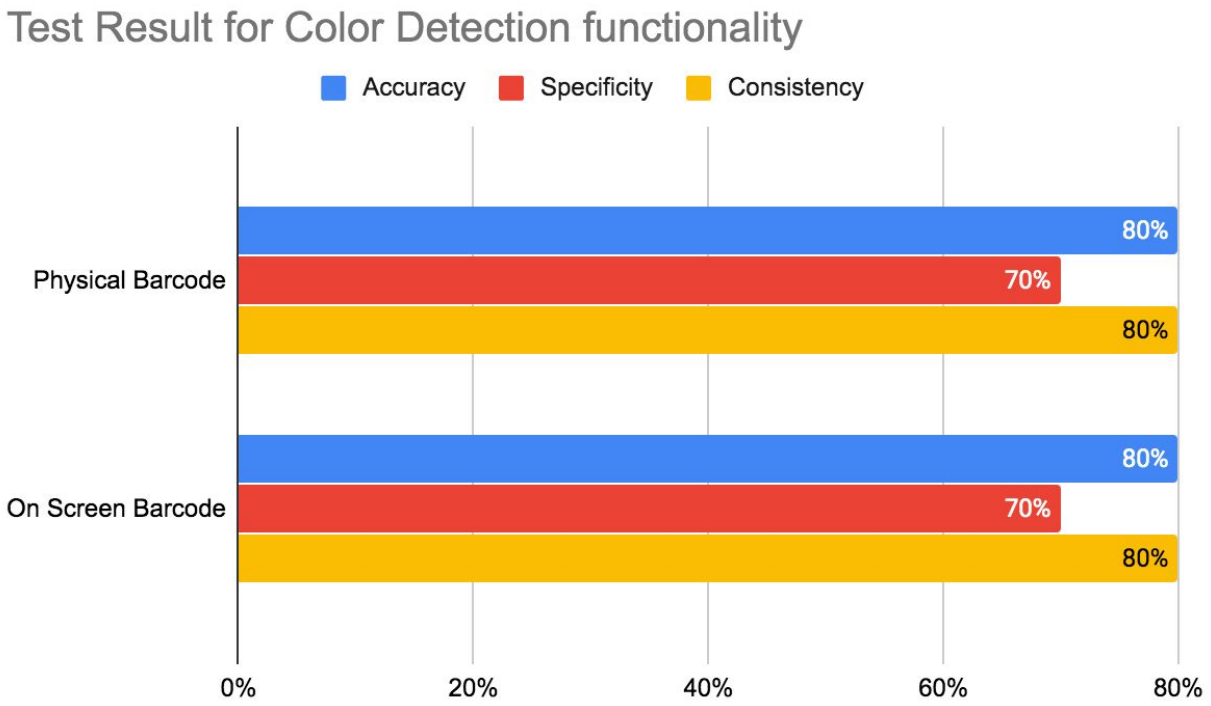
5.1.3 Test Result for Color Detection functionality

	Accuracy	Specificity	Consistency
Primary Color	**80%**	**75%**	**60%**
Secondary Color	**40%**	**30%**	**50%**



5.1.4 Test Result for Barcode Scanning functionality

	Accuracy	Specificity	Consistency
Physical Barcode	**80%**	**70%**	**80%**
On Screen Barcode	**80%**	**70%**	**80%**



5.2 Bug Summary

5.2.1 Hindi handwritten text detection

Problem ID : ENV_BUG_01
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 23 March 2020
Test case ID : E_05, E_07
Feature Name : Text Detection
Problem severity : Major

Problem summary

Whenever and wherever handwritten Hindi language script needs to be detected, the app does not detect.

How to reproduce?

Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

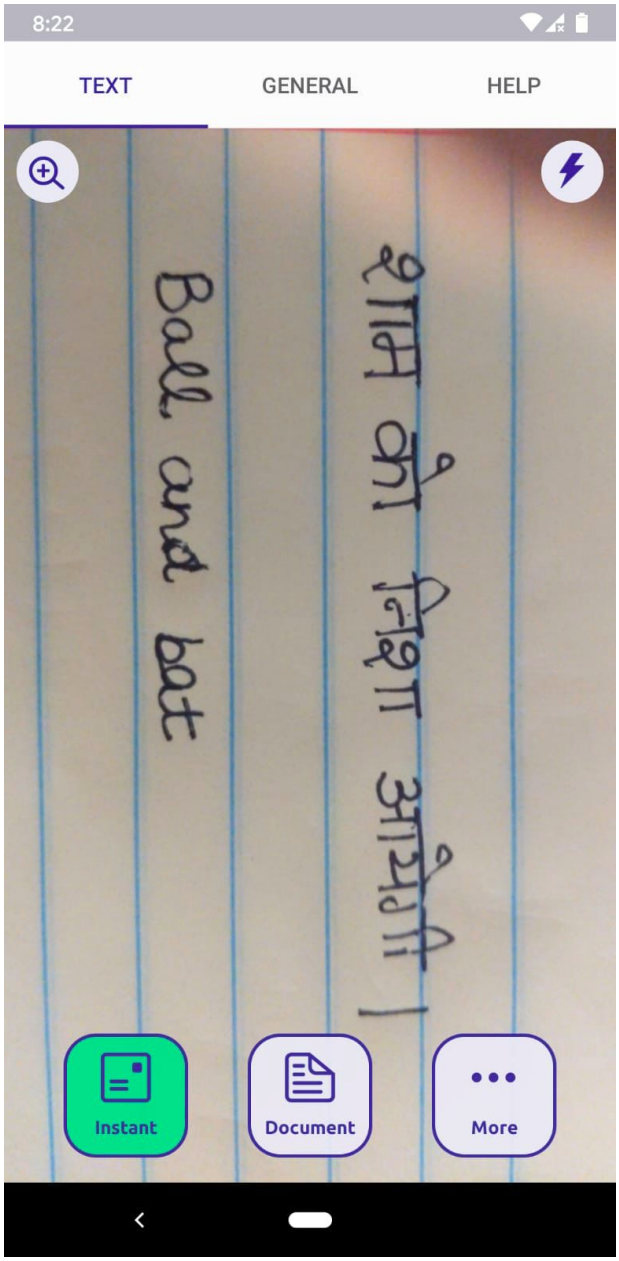
Step 3. User clicks on the ‘Text’ tab of the app on the top right of the screen.

Step 4. User clicks the 'Instant’ option at the left bottom of the screen.

Step 5. User focuses the mobile camera on a piece of text written in Hindi.

Step 6. The issue should be replicable.

Attachment



Ideally the instant text detection is supposed to read the hindi text then the english text. But it is not detecting and reading the hindi text and is straight away reading the english text.

5.2.2 Text Detection in a PDF having an Image

Problem ID : ENV_BUG_02
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 23 March 2020
Test case ID : E_20
Feature Name : Text Detection
Problem severity : Major

Problem summary

Under Text detection, if a pdf is uploaded with just an image the app miss detects the image with random text.

How to reproduce?

Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

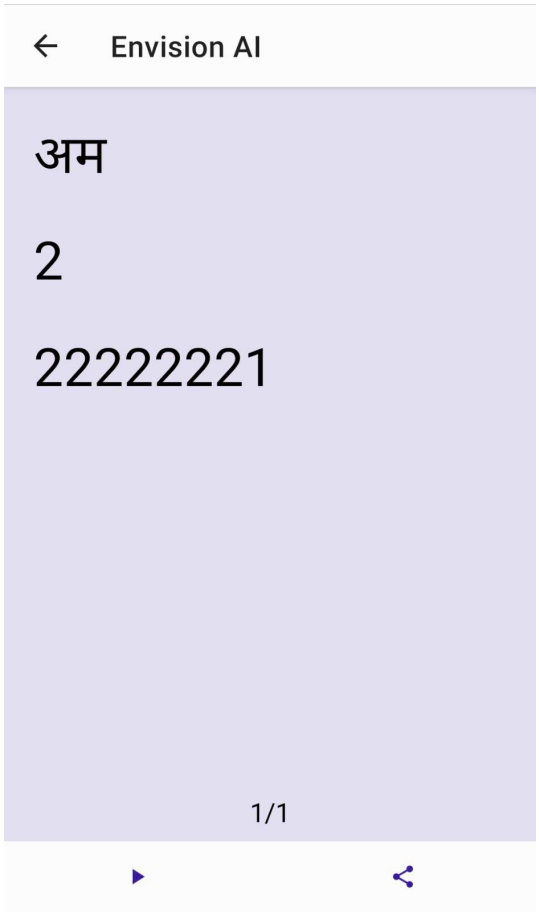
Step 3. User clicks on the 'Text' tab of the Envision app on the top right of the screen.

Step 4. User clicks on the 'More' option at the right bottom of the screen.

Step 5. User clicks on 'Import PDF'.

Step 6. User selects a PDF document having just an image.

Attachment



5.2.3 Object in the scene are not detected right

Problem ID : ENV_BUG_03
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 23 March 2020
Test case ID : E_34, E_35, E_36, E_37
Feature Name : Describe Scene
Problem severity : Major

Problem summary

The Describe scene feature is not accurate. More often the object in reference is misdetected.

How to reproduce?

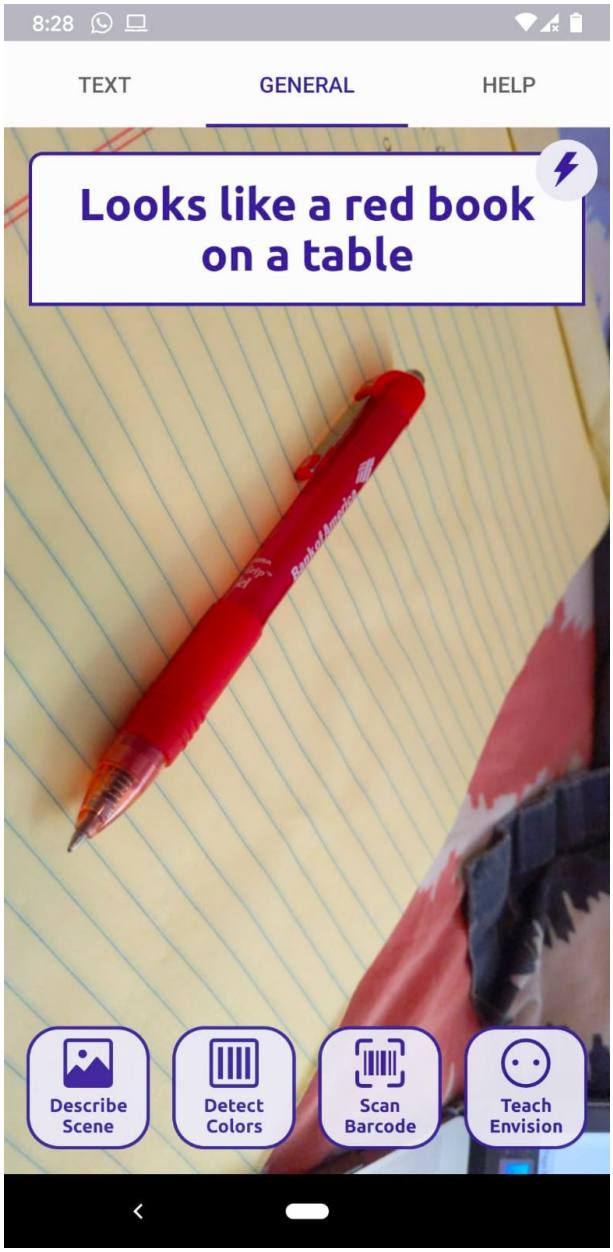
Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

Step 3. User clicks on the 'General' tab of the Envision app on the top right of the screen.

Step 4. User clicks on the 'Describe Scene' option at the right bottom of the screen.

Attachment


8:28
TEXT
GENERAL
HELP
Looks like a red book on a table
Describe Scene
Detect Colors
Scan Barcode
Teach Envision

5.2.4 Inconsistent “No text found” message display during Import Image

Problem ID : ENV_BUG_04
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 24 March 2020
Test case ID : E_24
Feature Name : Text Detection
Problem severity : Major

Problem summary

When text detection is tried out using an imported image that does not have any text, “No text found” message is not displayed consistently

How to reproduce?

Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

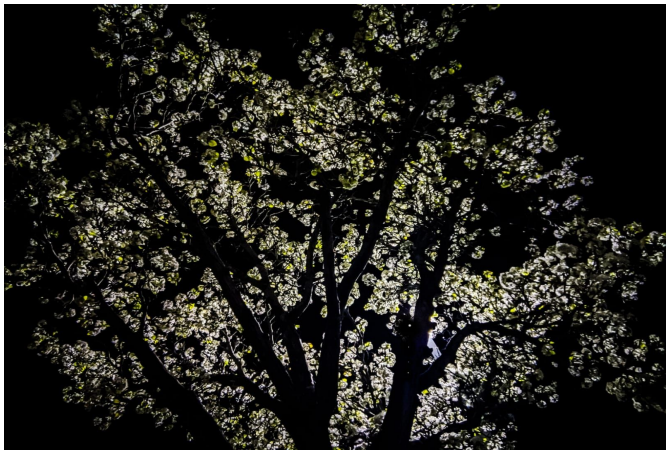
Step 3. User clicks on the ‘Text’ tab of the Envision app on the top right of the screen.

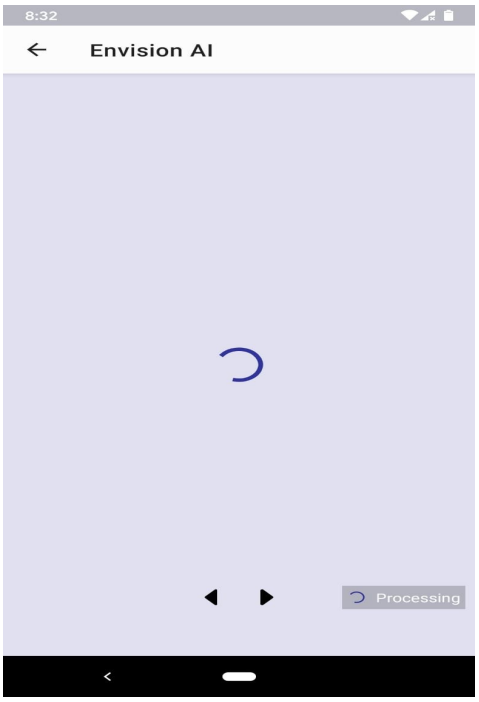
Step 4. User clicks on the ‘More’ option at the right bottom of the screen.

Step 5. User clicks on ‘Import Image’.

Step 6. User selects an image that does not have any text.

Attachments





5.2.5 Inaccurate and inconsistent color detection

Problem ID : ENV_BUG_05
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 24 March 2020
Test case ID : E_26, E_27
Feature Name : Text Detection
Problem severity : Major

Problem summary

When color detection is tried, colors are detected inaccurately. Sometimes it is inconsistent too

How to reproduce?

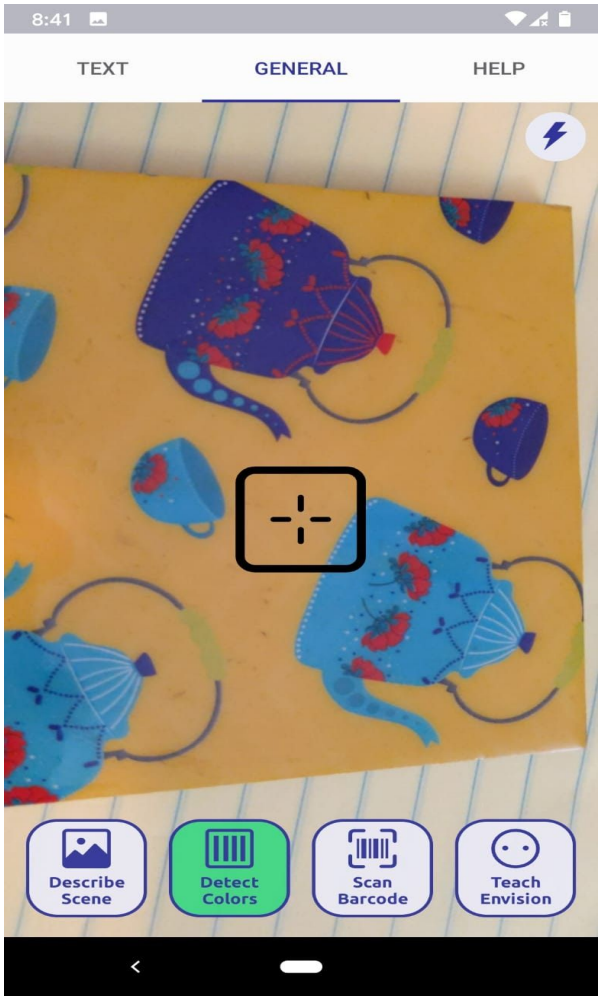
Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

Step 3. User clicks on the ‘General’ tab of the Envision app on the top.

Step 4. User clicks on “Detect Colors” and points at the color yellow.

Attachment



Application doesn’t identify the yellow color but identifies the color as some others which is an audio output and not text, hence screenshot cannot be provided.

5.2.6 Barcode Scanner Inconsistency

Problem ID : ENV_BUG_06
Current software name : Envision AI
Release no. and Version no : 1
Test type : Conventional testing
Reported by : Bhumika Tiwari
Reported date : 24 March 2020
Test case ID : E_28
Feature Name : Text Detection
Problem severity : Major

Problem summary

When bar code scanning is tried, the barcode details are not read. Hence the camera continuously keeps scanning the code.

How to reproduce?

Step 1. Envision AI needs to be installed on the device

Step 2. Successful user login to Envision app should be done.

Step 3. User clicks on the ‘General’ tab of the Envision app on the top.

Step 4. User clicks on ‘Scan Barcode’ and points to a barcode.

Attachments