

Department of Computer Science and Engineering
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CSE-3103 Software Engineering
Software Design Document(SDD)

Project Title : Visualization of segmentation of image taken by an android Smartphone.

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1. Introduction

1.1 Purpose

This file gives us a insight to the software design of the project - visualization of segmentation of picture taken with a smartphone. This document contains the scope of this application, system overview, system architecture, data and component design and human interface design.

1.2 Scope

This application will take a picture from an android smartphone as input and simulate some image segmentation algorithms on it. The CS major students along with statistics, probability and other students learning data analysis will be able to get a better understanding of the algorithms covered in this app.

1.3 Overview

a.This design document provides system overview in the second chapter which contains the overall design approach for the software.

b.In third chapter there is System architecture of the project comprising of physical and logical view, goals and constraints as well as reliability ,security issues .Modular decomposition view and design rationale is also included here.

c.In fourth part there is data flow analysis as well as the flow chart of the logical and physical data model .

d.Next part will give the component design of function ,interdependency of the layers of the project and the references.

e.The screenshot of the interfaces of the project will be provided here.

f. User requirement and the component traceability matrix

1.4 Reference Material

Algorithm:<http://stackoverflow.com/questions/5042445/best-segmentation-algorithm>

Android:<http://opencv-java-tutorials.readthedocs.io/en/latest/07-image-segmentation.html>

Definition and overall reference : <https://www.google.com/> and <https://en.wikipedia.org/wiki/>

1.5 Definitions and Acronyms

Definitions:

1.Image segmentation : The goal of image segmentation is to cluster pixels into salient image regions, that is, regions corresponding to individual surfaces,objects, or natural parts of objects.A segmentation could be used for object recognition, occlusion boundary estimation within motion or stereo systems, image compression,image editing, or image database look-up.

2.K-means algorithm : k-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster. This results in a partitioning of the data space into Voronoi cells.

3.Thresholding : The simplest method of image segmentation is called the thresholding method. This method is based on a clip-level (or a threshold value) to turn a gray-scale image into a binary image. There is also a balanced histogram thresholding.

Acronyms :

1.SDD: Software Design Document.

2. System Overview

This is an image processing software which is able to segment an image into salient part from which many handy editing tools like face recognition, image slicing, noise reduction ,background removal can be implemented . This software uses image taken by an android phone for subsequent processing and edit .Users can choose image of different format and implement various editing option very easily .

The target audience of the software is the mass people who use android phone and need to process image for better experience. This is user friendly for the people of all ages .The menu option will guide the user and give necessary direction which makes this software efficient as well as enjoyable.

3.System Architecture

3.1:Architectural Design

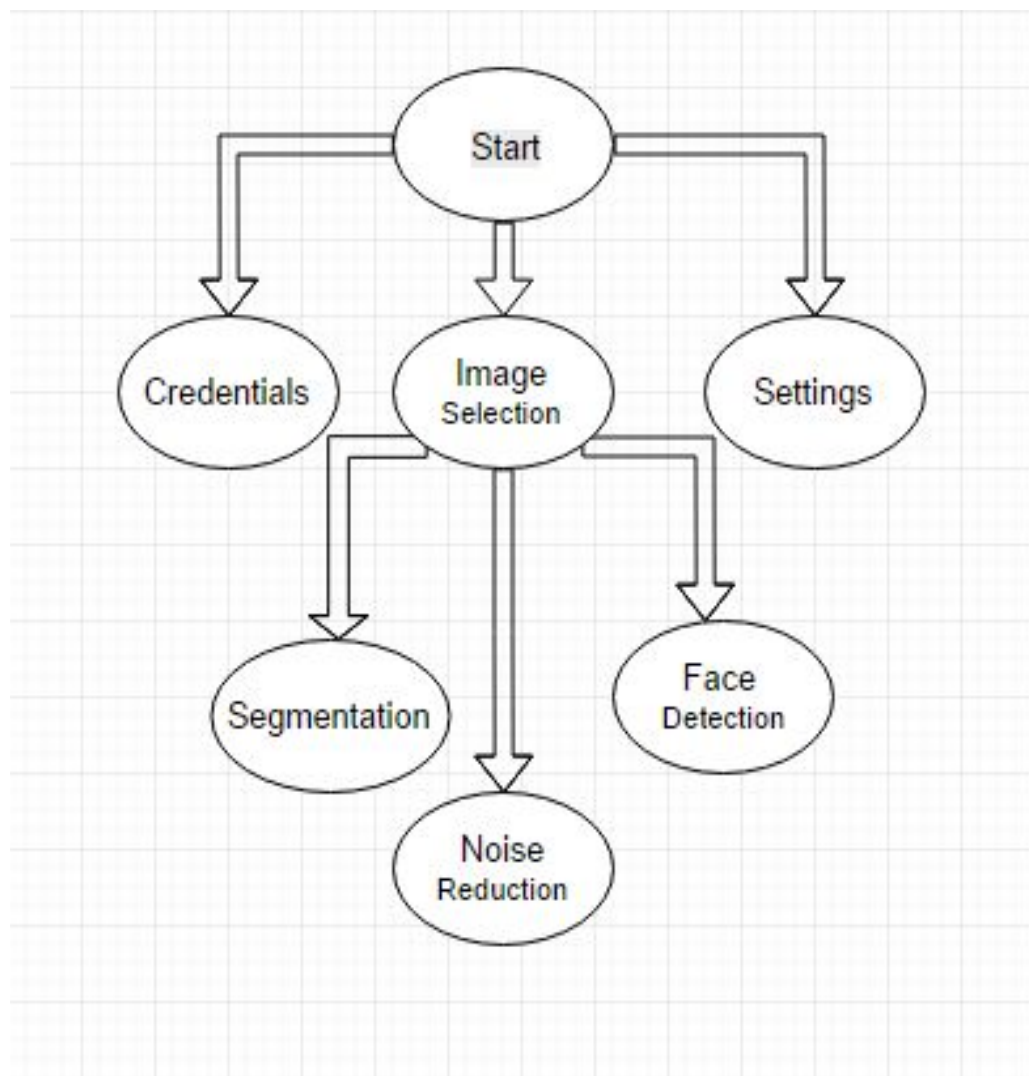


Fig1: Architectural design of the project

3.2 Design rationale

This design is chosen because this is a linear flow problem. There is no need of any complexity as this design satisfies all requirements .

3.3 Architectural goals and constraints

3.3.1 Security

The architecture which is shown above ensure the linear flow of data which makes the user pleasant while experiencing .This also ensured privacy issue through setting provided .

3.3.2 Persistence

The persistency of the software is worth mentioning as it is capable of auto saving frequently when an user starts using it. This makes the user feel better that no data loss is happening .

3.3.2 Reliability and availability

The editing options are reliable because the algorithms which are used here (k-means and thresholding) give pretty much accurate solution. Due to the open source platform of android operating system this is an easy to find and use app for the consumers .

3.3.4 Performance

According to difference performance testing methods like load testing, configuration and isolation testing the concurrency and throughput of the software is pretty okay. Due to some algorithm and hardware issue the scalability ,responsiveness performance need to be improved .

3.4 System logical view

Logical view clears how the software will logically work . This project is pretty simple which start with a main function initializing the startup interface . when user choose settings then customization programme becomes active. If image is scanned then editing programme handles the editing options available .

3.5 System process view

Process view gives the insight how the software is being used in physical layer. A person having android phone starts the application . The options are well defined which helps to use the features of the software easily .

3.6 Modular decomposition view

Modular decomposition view gives the demodulation of the software services which was implemented in the code level. The whole application is nothing but a bunch of functions which are being called from the main programme according to the preference of the user. This is also conspicuous from the system logical as well as physical view provided earlier on this document .

4.Data design

4.1 Data description

Image segmentation is done using raw data which are known as pixels . Manipulation of pixels lead to many editing options like segmentation and processing .By analyzing the pixel density this can be possible which is done through algorithms like k-means clustering or threshold .

4.1.1 Logical data model

Logical data model gives the clear idea of how the data is manipulating manually.According to our algorithm raw image is scanned like pixels which are changed to make the segmentation and other visualization tools.

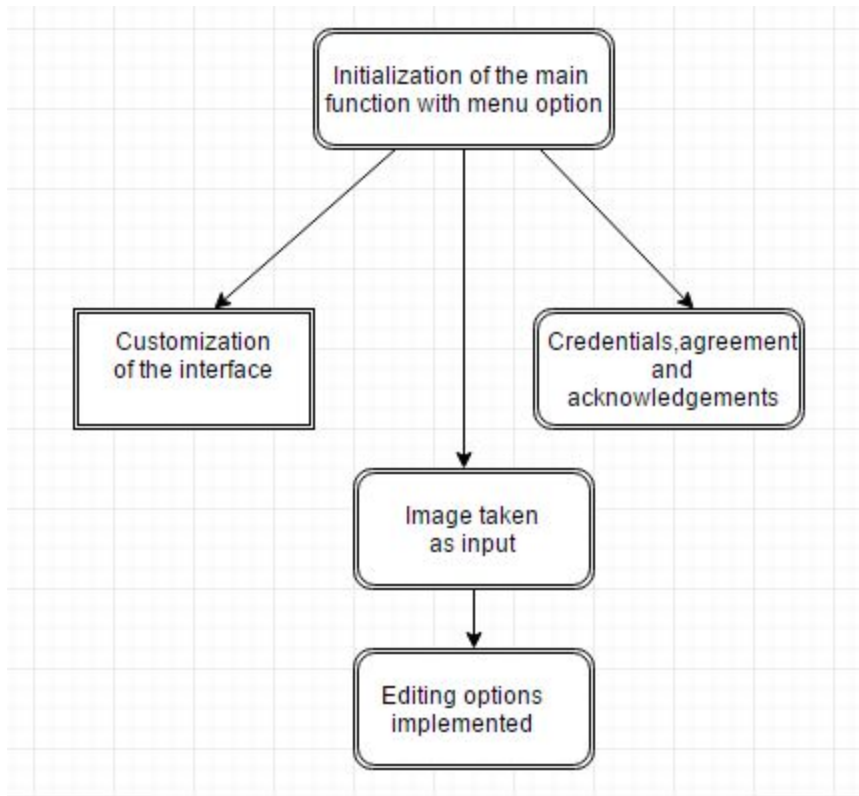


Fig :Logical data model

4.1.2 Physical data model flow

Physical data flow gives the diagram that how the data is managing in the physical layer of the project. Android user start the application and the options and menus guide to the use of the software.

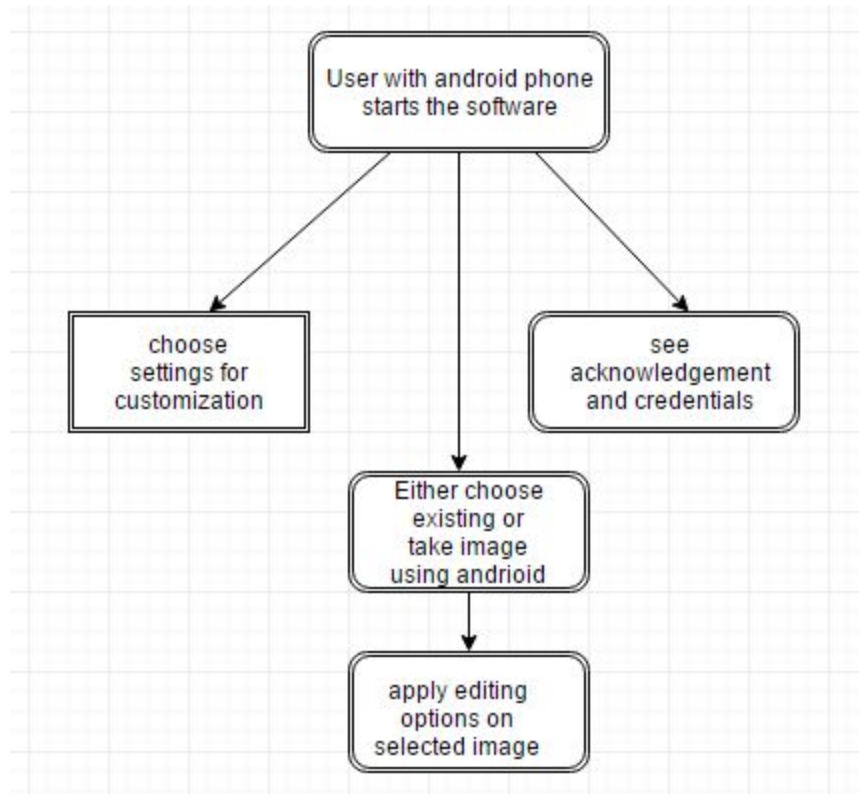


Fig: Physical data flow

4.2 Data Dictionary

Image segmentation : Defines the border and key parts of image.

K-means algorithm : Algorithm for image processing.

Thresholding algorithm :Algorithm for image processing.

SDD : software Design Document .

5. Component Design

5.1 Start-up activity

5.1.1 Type

Class

5.1.2 purpose

Contains the main menu of the app

5.1.3 Function

Calls the different activities based on which button was pressed.

5.1.4 Subordinate

Settings and credential options are available from here.

5.1.5 Dependencies

No dependency.

5.2 Image selection

5.2.1 Type

Class

5.2.2 purpose

Contains option for loading image

5.2.3 Function

Image is loaded when appropriate button is pressed.

5.2.4 Subordinate

Image processing functions

5.2.5 Dependencies

Start-up menu.

5.3 Settings

5.3.1 Type

Class

5.3.2 purpose

Customization option

5.3.3 Function

Interface customization and user friendly options.

5.3.4 Subordinate

No subordinate.

5.3.5 Dependencies

Start-up menu.

5.4 Credentials

5.4.1 Type

Class

5.4.2 purpose

Acknowledgement and news of update.

5.4.3 Function

Interaction with the authority for problem solving.

5.4.4 Subordinate

No subordinate.

5.4.5 Dependencies

Start-up menu.

5.5 Segmentation

5.5.1 Type

Class

5.5.2 purpose

Implementation of image segmentation on previously selected image.

5.5.3 Function

Interaction with the authority for problem solving.

5.5.4 Subordinate

No subordinate.

5.5.5 Dependencies

Selection menu.

5.6 Noise reduction

5.6.1 Type

Class

5.6.2 purpose

Reduction of noise on previously selected image.

5.6.3 Function

Making the image more conspicuous for viewers

5.6.4 Subordinate

No subordinate.

5.6.5 Dependencies

Selection menu.

5.7 Face Detection

5.7.1 Type

Class

5.7.2 purpose

Detecting human face on selected image .

5.7.3 Function

Detecting face from image.

5.7.4 Subordinate

No subordinate.

5.7.5 Dependencies

Selection menu.

6. HUMAN INTERFACE DESIGN'

6.1 Overview of User Interface

For the sake of greater comprehensibility, the interface has been kept simple and compact. The application starts with the app logo and takes the user to a fairly simple menu. The menu has options for Image selection as well as settings and credentials. After selection of image the next interface give image processing options visualization of segmentation, noise removal and face detection . Desired function become active on successful press on options .

6.2 Screen Images

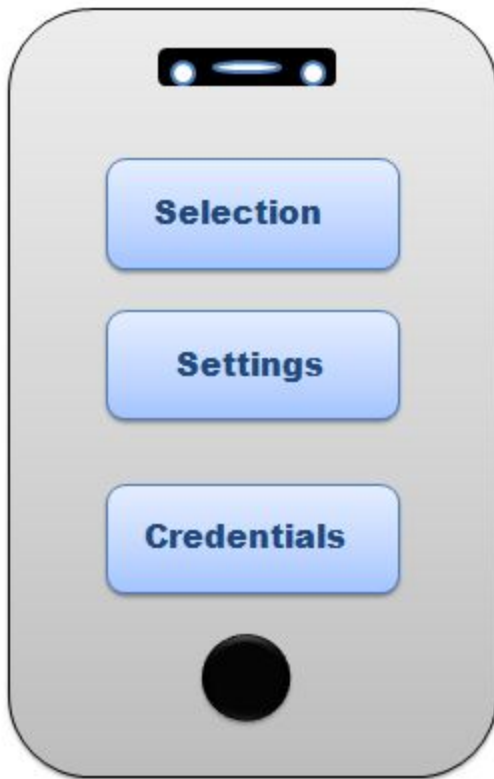


Fig : Main user interface

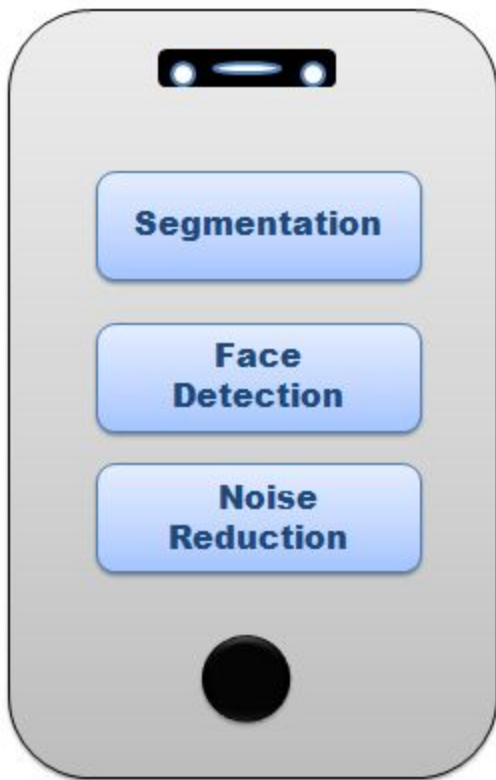


Fig : visualization and processing function

6.3 Screen Objects and Actions

6.3.1 selection

This option guides to choose image which is taken by an android smart -phone . After selection of image visualization and other options can be implemented.

6.3.2 settings

Provides necessary options for making the interface more user friendly and easy to use .

6.3.3 credentials

Application acknowledgement and update notification is provided here.

6.3.4 segmentation

Prime functional requirement of the project which is implemented on the selected image taken by an android smart-phone.

6.3.5Face detection

With the help of efficient algorithm this software detect faces on pressing desired button.

6.3.6 Noise reduction

Noise of the image can be reduced which makes the image more clear to the viewer .

7. USER REQUIREMENT VS COMPONENT TRACEABILITY MATRIX

A traceability matrix is a document, usually in the form of a table, used to assist in determining the completeness of a relationship by correlating any two baselined documents using a many-to-many relationship comparison

Traceability Matrix for Non Functional Requirement:

Non Functional Requirement	TC-1	TC-2	TC-3	TC-4	Test Case for Respective Requirement
1.Language					0
2.Error Handling			★		1
3.Availability					0
4.Security		★		★	2
5.Storage				★	0