Food Phone App to check the Quality of food, shelf life and combination of food

Dissertation 2 Report

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CERTIFICATE

This is to that **Aksa Irshad** (Registration No. 11719657) has personally completed M.Sc. dissertation 1 entitled **"Food Phone App to check the Quality of food, shelf life and combination of food"** under my guidance and supervision. To the best of my knowledge, the present work is the result of her original investigation and study. No part of dissertation has ever been submitted for any other purpose at any University.

The project report is appropriate for the submission and the partial fulfillment of the conditions for the evaluation leading to the award of Master of Nutrition and Dietetics.

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TABLE OF CONTENT

INTRODUCTION

Latest information technologies have made it reasonable for the scientific collections community to take the attitude for a nearly many years old scientific discipline. Information Technology now proceeds everywhere contrasting to the past several years. Digitization is an activity that shopping areas, factories, transport services, teaching institutions increasingly adapt, though many still do not still use it. On an international prospect, and digitization enhances the value of enhancement to major data collection.

Digital India Movement (DIM) launched by, Prime Minister in year 2015. DIM aims at achieving digitizing for numerous individual aspects of all central governmental agencies, for example education, health services and other services, that can be given to individuals availing Information and Communication Technology. By involving states of India and the Gram panchayats for improved speed internet via broadband connection, in order to see e-governance until coming year. Such program government prefers to take Public Private Partnerships, for the better running of this program. Government will improve National Informatics Centre which is responsible to carry Information Technology projects under governmental sectors. For faster design, development and implementation of various e-Governance projects, in at least 10 key ministries positions of Chief Information Office will be created and 9 key points of Digital India

(Ministry of Electronics and Information Technology, Government of India, Digital India power to empower, 2006 http://digitalindia.gov.in/content/about-programme).

The Sustainable Goals 2030 (UNDP) are also based to promote the following important set points that will mark the development of health, these are :

1) Goal 2 Zero Hunger- Enlarge finances via global association , in rural infrastructure, advances in extended agriculture, technological enhancement. Globally, 1/9 humans in the world today (795 million) are malnourished.

2) Goal 3 Good Health & Wellbeing- Advancing in health related finances and all round advancement of health workers of develop better living.

3) Goal 4 Quality Education-By 2030- Increasing the grant for trained educational workforce in the developing and developed nations through the international support.

4) Goal 9 Industry, Innovation and Infrastructure- Technological progress is vital to find explanations for economic and environmental challenges, such as giving jobs and soaring energy efficiency. Promoting sustainable industries and financially supporting researchs in science and innovation.

(Sustainable Development Summit, September 2015
http://www.undp.org/content/undp/en/home/sustainable-development-goals.html)

Product development of food and renovation is seen as a grave way to contentious victory and for fast growing international market (Harmsen, 1994). Despite of the education, a huge group of recent products (>70-88 %) continues as unacceptable, giving light to the troubles faced by retailers most recently. The rise in prices of good brands with high prices pose an alarming situation for retailers. Rise in the economy and urbanization, and the purchasers are worried about quality of food and it's safety, and promotionally blooming exports of agriculture proves significant for rising consciousness to food safety in in this nation. Food safety is hindered by regulative government sales policies, poor regulations and governing setup on food safety, the standards are not followed in a proper manner due to feeble government regulations.

(Peters, 1994). On the other hand the consumers are more aware of the quality and personal choice (Mintel, 2003).

PROBLEM BACKGROUND

Farmers sometimes are not able to visit test laboratories for analysis and quality evaluation of grown crops. So this study focuses on helping farmers and other people in assessing the quality of the crop by just scanning their food item and in a click of a button, they will get all the required information regarding nutrient content, presence of any disease, spoilage methods and possible food combination for a safe consumption.

REVIEW OF LITERATURE

CURRENT SCENERIO OF VARIOUS FOOD & NUTRITION APPS

Serial No.	Application	Special feauture	Combatibility	Functioality	Drawbacks	Size	Category	Source/reference/ Developers website/ Web link of Appp
1.	Nutrients	Facts on calories vitamin and mineral content, Nutritional data for thousands of foods, easy to look any food, customizing serving.	iOS 9.3	Anyone	Needs upgrading in food database	32 MB	Food and Drink	http://www.pomegranateapps.com/nutrients
2.	Food Intolerance	Histamine intolence,malabsorption of macronutritents ,lots of flexibility	iOS 8.0	People with food allergies	-	53.4 MB	Food & Drink	http://baliza.de/en/apps/histamine.html
3.	My Plate	Nutrition information, calorie tracker,exercise, weight progress , Community	Android 4.1 +	Anyone	Better reminders	16 MB	Health & Fitness	https://www.livestrong.com/myplate/
4.	Waterlogged	Quickly record, Sets alarm	Android 4.2 +	Athelets and Common perso	Time and date not logged	7.7 MB	Health & Fitness	https://play.google.com/store/apps/details?id=com.daylogger.waterlogged&hl=en

				n	properly			
5.	HealthyOut	Find healthy meals from local restaurants (fliter by cusines, dish and even ingedient). - Healthy Out dishes have 1/2 the macronutrients than usual menus - Uses filters to save time. Alternative options for restricted diets. Popular diets.	iOS 6.0 +	Anyone and Nutritionists	-	23.1 MB	Food and Drink	http://www.healthyout.com/
6.	MyNetDiary	Photo Food service, tracks lab results and diet planning.	Android 40 +	Prediabetic, Diabetes 1 and 2 and gestational diabetes	-	19 M	Health & Fitness	http://www.mynetdiary.com/

7.	Food Diary	Easy and great design logging not needed,thousands of items in database ,full off-line support, daily report,personal reminders.	-	Anyone	-	Varies with device.	Health & fitness	http://www.ieatbetter.com/
8.	NutriSport Ex	Pre and post atheletic training menu	iOS 8.0	For sports person	No reminders and entertainmant features lacking	5.5 MB	Health & Fitness	Pushpa et al; 2018
9.	Shop Well	Allerts for food allergens	Ios 8.0 +	Shoppers, Anyone, Nutritionists,	Operates slow while in use.	65.1 MB	Health & Fitness	http://www.shopwell.com/
10.	My Fitness Pal	6 + million foods in database , barcode scanner, water tracking	iOS 10.0 +	For any one	Low compatibilty, No dietary restriction alerts	185.7MB	Health and Fitness	http://www.myfitnesspal.com/iphone
11.	Fitocracy	Record weekly food intake	iOS 7.0 +	People who want	No reaarangement and	21 MB	Health & Fitness	https://www.fitocracy.com/

		average s		to loose weig ht	renam ing of foods in favorit e list			
12.	Carbs Contr ol	Allows users own customi sed food list, calculat es Net Carbs, incorpor ates latest food data base on updatin g App.	iOS 8.0	Anyo ne	Not update d info of Nutri bars.	34.1 MB	Health & Fitness	http://www.carbscontrol.com/
13	Food Trippi ng	Discove r healthy, sustaina ble food options	iOS 8.1 +	Trave llers	More food option s needs	9.5 MB	Health and Travel	http://www.foodtripping.com/
14	Foodu cate	Healthy food calorie counter, large databasr for food barcode scanner, diet tips	iOS 9.0 +	Peopl e want to loose weig ht, Nutri tionis ts	-	46.6 MB	Health and Fitness	http://www.fooducate.com/
15	Big Oven	350,000 recipes, grocery list, use of leftover s	iOS 10.1	Anyo ne, Nutri tionis ts	Neede s more upgra dation	104. 6 MB	Food & Drink	http://www.bigoven.com/
16	My Diet Coach	Customi ze your avatar, reminde	Ios 10.0 +	Anyo ne who wants	Users weigh t limitat	135 MB	Health &Fitness	http://www.mydietcoachapp.com/terms-of-use

		rs on set goals, caoie counter and diet diary		to loose weig ht	ion			
17	Vitam in Defici ency Finder	Daignos is via queaton s, Vitamin informat ion.	-	Peopl e suffer ing defici ecny.	Lack of Vitam in K infor matio n.	Vari es with devi ce	Health and Fitness	http://www.yantramind.com/
18	mHeal th	Plannig n accordin g to medical conditio n	Android 4.0.3 +	For elderl y peopl e	Needs upgra dation	9.7 M	Health & Fitness	Torre Diez et al, 2017 http://www.saieshinfosolutions.com/

Table1. An Overview of the current Apps available to consumers.

The above Apps have been downloaded and the functionality as well as usage checked for it's utility and ease of use. The data was then compiled so that the same can provide valuable information for the development of FoodEssential App. This way the review of the users had also been studied and as to how it is beneficial and what improvement they consumer requires for these Apps. According to Google Playstore survey 10 Apps were most prominent and those are also mentioned above.

PROPOSED RESEARCH OBJECTIVES

1) Android fetching of imagery and Data base mining.
2) To organize the selective App panels and information feeding.
3) To verify the quality of parameters
4) To test the App efficiency and compatibility through consumer feedback

PROPOSED RESEARCH METHODOLOGY

OBJECTIVE 1- ANDROID FETCHING OF IMAGERY AND DATABASE MINING

The significant Data Mining Sites for fetching data are:

- FSTA- Food Science Technology Abstracts
- PubMed
- SID- Scientific Information Database
- BASE- Bielefeld Academic Search Engine
- Science.gov
- AGRIS- Agricultural database of Open Access Journal
- Google Scholar
- IEE Xplore
- U.S National Agricultural Library Online Access
- Google Scholar

The App will be able to capture the picture and check for the possible defects of the following food categories:

1) Vegetables and Fruits
2) Poultry, meat and seafood
3) Mushrooms

CATEGORY I- FRUITS & VEGETABLES

The locally grown categories of fruits and vegetables will be selected for the scientific evaluation to check the quality. All these sensory evaluation will not be taken into consideration like flavor, taste, aroma, mouth-feel and texture. However the following considerations will checked as follows:

1) **Color measurements**

Under the quantitative analysis, the pigmentation on the outer surface of the food gives an approximation. For example the ripening a tomato can be measured upon the certain redness in it and that of a banana can be noticed again with the color intensity on the outer membrane. Any contrasting colors or blemishes, spots and bruises may result in the reduced quality.

2) Surface types and diseases

The following things can be checked on the surface of the food. For example the following defects can be detected on surface of berries below in the pictures (Pulido et al, 2012)

Spray injury

Various chemical sprays can injure blueberries.

Bravo injury to fruit.

Fruit injury resulting from surfactant burned flowers.

Hail damage

Hail injury to ripening fruit.

Green fruit with dents and bruising from hail.

Bird damage

Bird feeding damage.

Rain cracking

Fruit cracking caused by rain shortly before harvest.

Shriveling of Elliott fruit

Berries of the Elliott variety occasionally soften and shrivel before they are fully ripe. No cause has been identified.

Fig No. 1 Quality analysis of frutis on the basis of quality parameters (Pulido et al, 2012)

2) Surveillance of Presence of Disease

The device will indicate the disease after evaluating the possible symptoms visible on the surface of the food. Taking the example of Apple alone, it has several disease that not yet identified by the consumers. These are:

1) Sooty blotches- foamy specks on the outer skin of the fruit
2) Flyspeck- black and shiny dots.
3) The patchy appearance results from the growing mass of tiny interconnected and tightly connected darker hyphae. (Pujari, 2013)

CATEGORY II MEAT, POULTRY AND FISH

The quality analysis of meat, fish and poultry selected for the scientific evaluation to check the quality. Lean color is the primary factor that determines the fresh meat quality. Meat when exposed to harsh lightening when stored and under the influence of Myoglobin and Oxymyoglobin with oxygen leads to turning meat to brownish red color. (Bjorn et al, 2017).

Optimum surface colors of fresh Meat pieces

Animal Meat type	**Optimum color**
Beef cuts	**Cherry red**
Lamb cuts	**Cherry red**
Pork cuts	**Pale pink**
Chicken cuts	**Bluish cast and yellowish skin**
Whole Fish	**Bright red color of the gills.**

CATEGORY III- MUSHROOMS

Mushrooms are highly perishable items and are not easy to predict how long they may be edible, that is why it's important to detect their freshness on purchasing of these mushrooms. Sometimes it's difficult to

detect on the basis of sense of smell alone as they may not seem a suitable method for some people.

1) Color

The quality can be checked but observing the dark black-brownish spots on the spongy surface of mushroom. They may also give a wet or wrinkly appearance. The **mushroom gills** are the main identifiers of spoilage as the rotting process begins on darkening around the same area.

2) Texture

Another indicator that the mushroom is still edible and not harmful is by looking at the cap (top round and smooth part of the fungus). If it is touched and seems soft and viscous then mold and bacterial growth it starting to spoil it.

The quality testing of Milk and milk products, cereals and grains will based on the same quality analysis parameters like color, diseases and other deformities (Haymann et ai, 2010).

OBJECTIVE 2- ORGANIZATION OF THE SELECTIVE APP PANELS AND INFORMATION FEEDING

Device Identifiers

1) The App can access, collect, monitor, store on device and remotely store one or more “device identifiers”. These are small data files or similar data structures stored on or related to mobile device. A device identifier may be data stored in connection with device hardware, data stored in connection with device’s operating system or other software, or data sent to device by FoodApp (Boulos et al, 2011).

2) Metadata
   It is actually technical information which associates to required data. For instance, it is possible to explain how and when a piece of user content is collected then formulated specifically.

3) Mining of Data – The four major steps in data mining includes the following :
   - Selection of Data
   - Cleaning of Data
   - Transformation of Data
   - Searching of Particular Pattern
   - Fining interpretation and evaluation and broad process of finding data visualization (Serrano, 2017).

THE APP DESIGN

THE HOMEPAGE

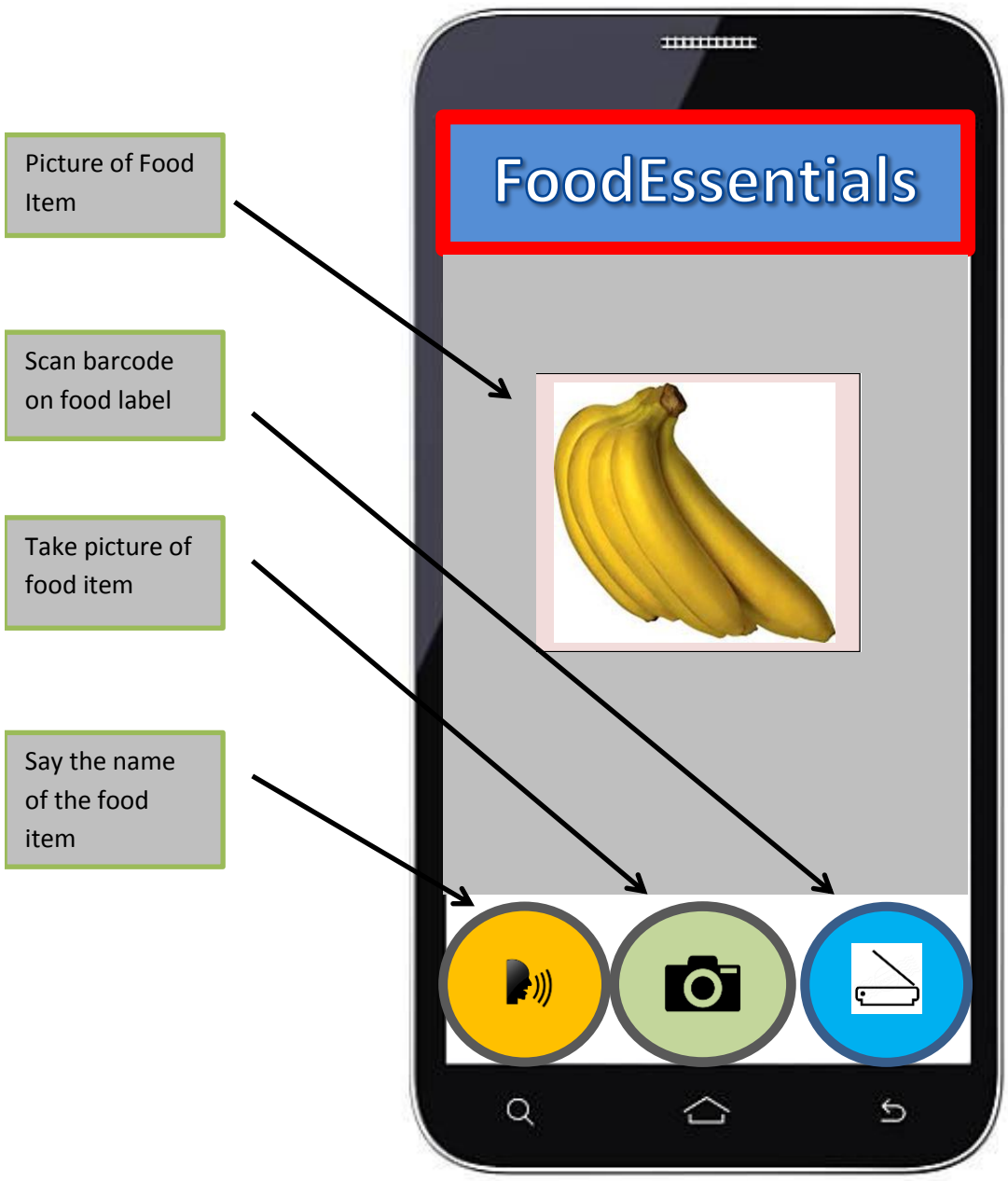

Fig No. 2 Capture a picture, Say it in Audio recording or scan Barcode (Blueprint model for the expected App)

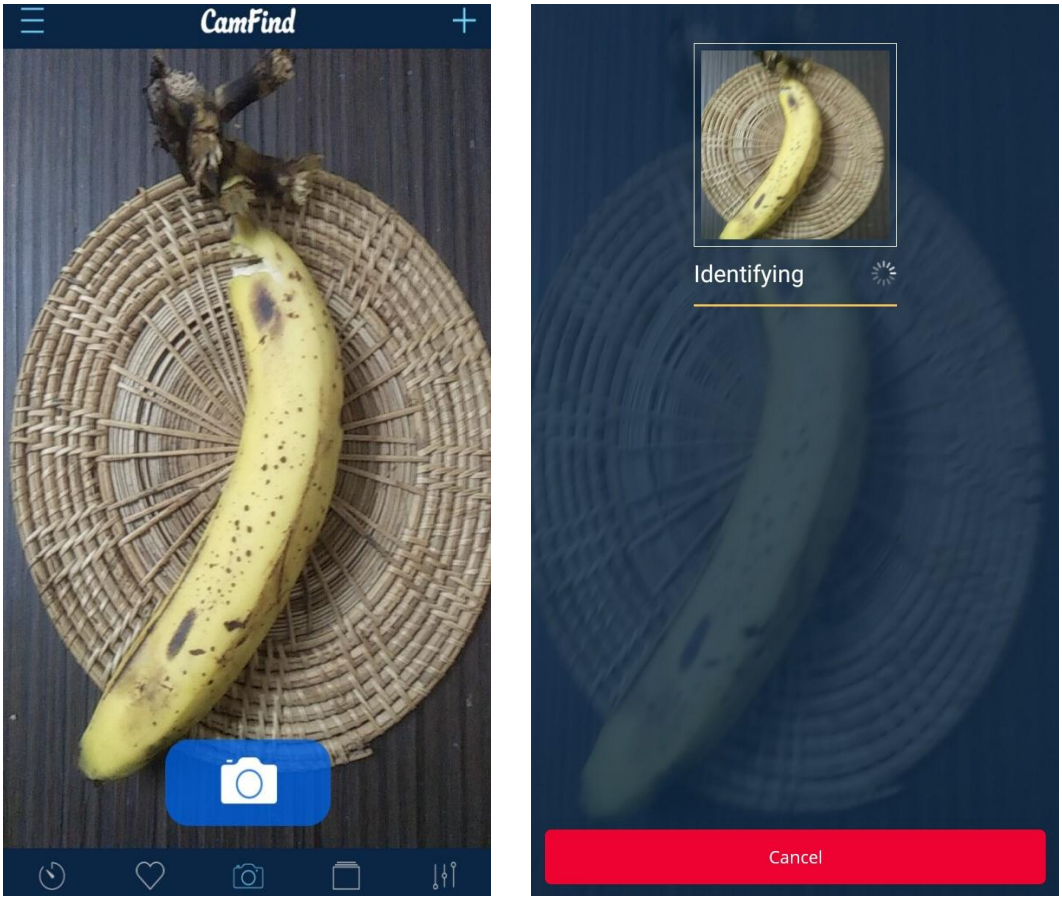

Fig No. 3 Pictures taken from (CamFind, 2013) https://cloudsight.ai/api

Once the Picture is identifid the App will recognise it with the fed database (CamFind, 2013). For example, the product can be evaluated for presence or absence of colour, cuts, low temperature injury, spots present, bruises, presence of any specific defects, diseases shape and categorise it into No defect, Edible, slight defect, Moderrate and Extreme.

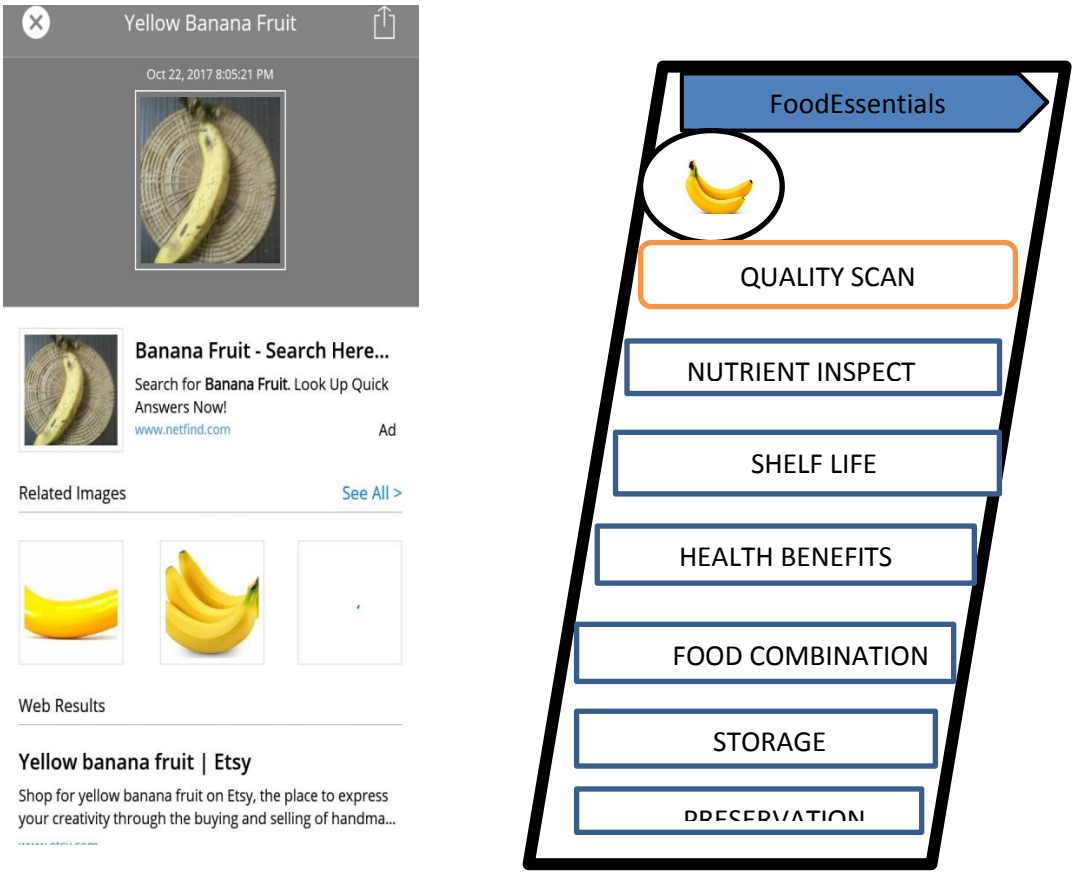

Fig No. 4 Pic (a) Taken from CamFind & Pic (b) Main page of FoodEssential App

Panels will appear when the food item has been successfully scanned and the cunsumer can choose from it. Once the panel of choice has been selected the information page opens and has options to Go back to Main Page inorder to select any other options.

OTHER FEATURES

1) **Health Benefit**

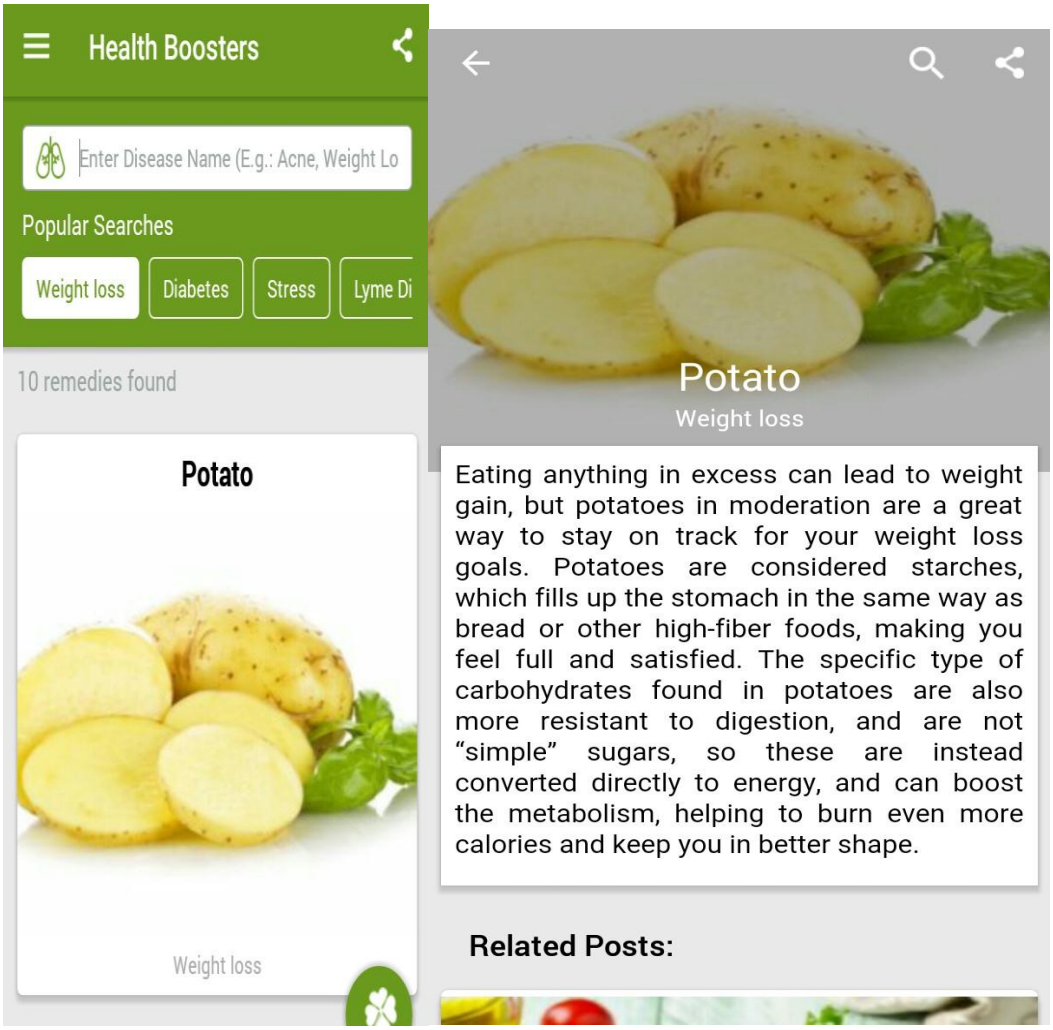

Fig No. 5 Picture from (OrganicFacts, May 2017)

On clicking on the health benefit panel after the food item has been identified, the page appears giving prominent health benefits of it according to latest research.

2) **Shelf Life Panel**
Gives information of the best edible date of the food item and when it will expire.(FoodKeeper, 2015).

3) **Food Combination Panel & Preservation**
Gives information about the best combination of healthy food to consume with the scanned item also the Preservation panel will the details and methods of preserving that food item (Fooducate 2009 & FridgePal 2013).

4) **Store In** Guides the consumer to better storage under specific temperature to prevent spoilage (FridgePal 2013).

OBJECTIVE 3- VERIFICATION OF QUALITY PARAMETERS

Regionally grown fruits and vegetables available in Punjab region. Some are also available from nearby regions of Himachal Pradesh (H.P)(North) in the southern region of India. Also, mercenary vegetable and fruits growing, kitchen gardening is promoted by Applied Nutrition Programme which has been encouraged in various states.

The following vegetables will be taken into study:

Summer vegetables and fruits.

Chilies, okra, bottle-gourd, vegetable,

Squash melon, bitter gourd, pumpkin, sponge gourd, zucchini, chayote, ash gourd, water melon, mangoes, papaya, banana, grapes, pineapples pears, cantaloupe, grape fruit, lemon, berries, pomegranate, tangerine, lychee, goose berry, guava cucumber, arum, sweet potato.

Fruits and vegetables available in winter season.

Potato, cauliflower, cabbage, tomato, radish, broccoli. turnip, carrots, brinjal, kale, bell pepper, spinach, apples fenugreek, onion, garlic, lettuce.

Meat, poultry and fish to be included will be pork, beef, lamb and mutton, chicken, turkey, duck, wild boar, fish (tilapia, catfish, catla, rohu, trout, hilsa, sole, Indian salmon, promfret, king mackerel) and mushrooms

More products will be added throughout the App development.

OBJECTIVE 4- CONSUMER TESTING OF APP EFFICIENCY

According to Dhougoda, 2012, an Android Application can have the option of creating questionnaires within the operating system. And this consists of the selected questions of survey that the manufacturer requires in order to improve the App feasibility for the potential users. The consumers leave their comments or there can be questions appearing while the App is in use. The following set of instructions are given to the operating system to create a survey :

- Start
- Give name of question to create
- Input of questionnaire language
- Select answer type for that question
- If answer type is multiple choice, if yes, give input fields
- Fill in options
- Still more questions
- Submit the survey
  The survey outcome can be established once all these commands are stored and ready to use.

EXPECTED RESEARCH OUTCOMES

- User friendly android based application will be developed.
- The developed application will help the consumer, farmers, as well as industry to identify and select various food products, raw material etc. based on their quality parameters.
- Food safety concerns could be reduced with help of the user friendly application.
- This App will be used by anyone who owns a smartphone and internet. People of any age group, fruit and vegetable vendors, consumers or buyers, students, health workers and even the food industry can use it to view information of a particular food item. Imagine at a click of button appears the quality of that food item, highlighting if it is fresh, free from diseases or passed its shelf life all information regarding the nutrients and it's health benefits appears on screen. This Smart phone technology will enable easy access, transfer and tracking of information and interactive displays instantly

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