



Bilkent University

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Department of Computer Engineering

# Senior Design Project

# Farket

## Specifications Report

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# Contents

<b>1 Introduction</b>	<b>3</b>
1.1 Description	3
1.2 Related Technologies	4
1.3 Constraints	5
1.3.1 Economical Constraints	5
1.3.2 Ethical Constraints	5
1.3.3. Implementation Constraints	5
1.3.4 Technical Constraints	6
1.3.5 Sustainability Constraints	6
1.3.6 Language Constraints	6
1.4 Professional and Ethical Issues	6
<b>2 Requirements</b>	<b>7</b>
2.1 Functional Requirements	7
2.2 Non-functional Requirements	7
<b>3 References</b>	<b>9</b>

# **1 Introduction**

As the economical conditions get worse and therefore quality of life gets lower in a country, more and more people are starting to count dollars. However after a while counting dollars become a daunting task for almost everyone, because it is very time and energy consuming with infinitely many different prices and daily discounts that markets offer to people.

The aim of this product is to automate the process of grocery shopping, therefore making it an easy and affordable task for everyone. We realize that achieving this task will be a life-changer for many people. Our product offers an environment of a community sourced development where every individual can help improve the overall performance and accuracy of the system by scanning their receipts. Harvesting the power of machine learning and image processing, shopping for the greatest deals will never be a daunting task again.

## **1.1 Description**

The purpose of this product is to solve the problem of the daunting part of taking best offers as possible from discounts and to optimize the price differences of same products among different markets. It is almost impossible to visit several different markets mainly because them not being located close enough to each other and even if they are, it is even harder to track all the prices which change daily. We propose a system which will solve this problem altogether by creating a smart system that specifically targets each user's needs by gathering data by using several different options which will give breathing space to handling the problem of keeping the database up-to-date, creating personal experience for each and every user on the way while finding the greatest deals on nearly every market.

This personal experience will depend on the collection of data for each user. This would mean the more data the user shares, the more personalized experience they will be offered. The problem of the assumed correlation of lower prices meaning lower quality is also solved since the system will only allow alternative brands only if allowed so. Moreover, for people who might like to further reduce their prices and have some free time will be offered the shortest route of each market with the list of items that should be bought from there and even the transportation opportunities.

## 1.2 Related Technologies

Some of the similar technologies are described below:

- **Favado:** Makes it possible to search for specific product sales and centralized coupon database [1].
- **Bring!:** Grocery shopping list app that allows users to create, sync and share shopping lists with everyone involved in planning [2].
- **Grocery Pal:** Finds sales at supermarkets and stores for a specific grocery [3].
- **Grocery IQ:** Notifies users about discounts and coupons. Creates shopping lists from its database [4].
- **Basket:** Compares store and online prices after creating a shopping list [5].
- **Cimri.com:** Allows the user to search products from a database and see the best offers [6].
- **akakce.com:** This system is very similar to Cimri.com, trying to offer best prices possible. Compares prices of items of approximately 45 different stores [7].

There are closely related technologies in the sector as described above, however, our project uses the modern computer science concepts such as Computer Vision

and Machine Learning to create to satisfy the consumer need. Also, there is no other product in the market providing shopping route recommendations.

### **1.3 Constraints**

#### **1.3.1 Economical Constraints**

- The application will be free to use.
- Google Cloud API's (Maps, Vision) may cost some money if the usage limit is exceeded.
- Apple Developer subscription is 99\$.
- Discount advertisement on the app will be a source of income.
- To encourage people to scan receipts, we will have to give them small gifts such as discount coupons or money.
- To collect the missing data we might employ people.
- We will need to pay for AWS.

#### **1.3.2 Ethical Constraints**

- To extract the data we consider scraping online shopping websites which is in a gray spot for legal purposes [8], if there is no consent of the website owner therefore necessary permissions will be taken.
- Security has utmost importance because of the nature of our product, meaning that it collects a lot of sensitive information about the user and also uses phone camera.
- Without the approval of the user no personal data will be shared.

#### **1.3.3. Implementation Constraints**

- The product is a cross platform mobile app that runs on both Android and iOS.
- The application will have client-server architecture.
- Client side will be developed using React Native.
- Server side will be developed in Java.
- Github will be used as version control system.
- Google Maps API will be used for shopping route recommendation.

- Google Cloud Vision API will be used for OCR.
- The server will run on AWS.

#### **1.3.4 Technical Constraints**

- We will need immense computational power for OCR and route recommendation considering the size of our target group.
- Our database must be scalable to serve up to many customers. This also requires lots of storage area.

#### **1.3.5 Sustainability Constraints**

- Consumer price and discount data must be always up-to-date.
- Users must be encouraged scanning receipts for continuous information. This is a major issue regarding the continuity of our product.
- Constant user feedback is a must for more convenient UX.

#### **1.3.6 Language Constraints**

- The application's language will be Turkish because customer and market basis will be in Turkey.
- New languages and stores might be added in the future.

#### **1.4 Professional and Ethical Issues**

- Users' location data will be stored in order to calculate an optimal shopping route close to their coordinates. This data needs to be stored confidentially and shouldn't be shared with third party applications (excluding Google Maps) to secure the users' privacy.
- The application will access the camera in order to scan and process the receipt images taken. The permission to access the camera will be asked to the user. The receipt image processing functionality will be enabled if the app has permission to access to camera.

- The shopping lists users have created will be analyzed and processed in order to come up with targeted advertisements. The permission needs to be taken from the user to have this functionality.

## 2 Requirements

### 2.1 Functional Requirements

- The users can see detailed information about products that we store in our databases. Detailed information will be reached from both the data from receipt scanning or web scraping from the online markets of these stores. Web scraping might be illegal depending on the circumstance, however we plan to solve this by making deals with these retailers and making them agree to share their data.
- The users can scan their shopping receipt by using our application.
- The users can get shopping route recommendations by entering a shopping list.
- The application notifies users about discounts.

### 2.2 Non-functional Requirements

- **Usability:** The application must be easy to use for variety of age groups.
- **Reliability:** The application must serve to large number of users during its runtime.
- **Response time:** The application must respond quickly to receipt scan so that the users would not wait for long durations. The application should also be responsive while large number of users are using it at the same time.
- **Data integrity:** The application must assure accuracy and consistency of the product data.
- **Availability:** The product data must be accessible when required for use.
- **Scalability:** The application must accommodate the growth of its database.

- **Robustness:** The application must cope with the errors during its runtime.
- **Extensibility:** The application must be extensible such that it can handle adding a new functionality or modifying an existing one.
- **Security:** The application must secure its user data from potential external forces.

### 3 References

[1] “Favado”

<https://play.google.com/store/apps/details?id=com.savings.android.grocery&hl=tr> [Accessed: 03- Oct- 2018]

[2] “Bring!”

<https://getbring.com/#!/app> [Accessed: 03- Oct- 2018]

[3] “Grocery Pal”

<https://play.google.com/store/apps/details?id=com.twicular.grocerypal.android&hl=tr> [Accessed: 03- Oct- 2018]

[4] “Grocery IQ”

<http://www.groceryiq.com/> [Accessed: 03- Oct- 2018]

[5] “Basket”

<https://basket.com/> [Accessed: 03- Oct- 2018]

[6] “Cimri”

<https://www.cimri.com/> [Accessed: 03- Oct- 2018]

[7] “Akakçe”

<https://www.akakce.com/> [Accessed: 20- Oct- 2018]

[8] “BenBernardBlog”

<https://benbernardblog.com/web-scraping-and-crawling-are-perfectly-legal-right/>  
[Accessed: 20- Oct- 2018]