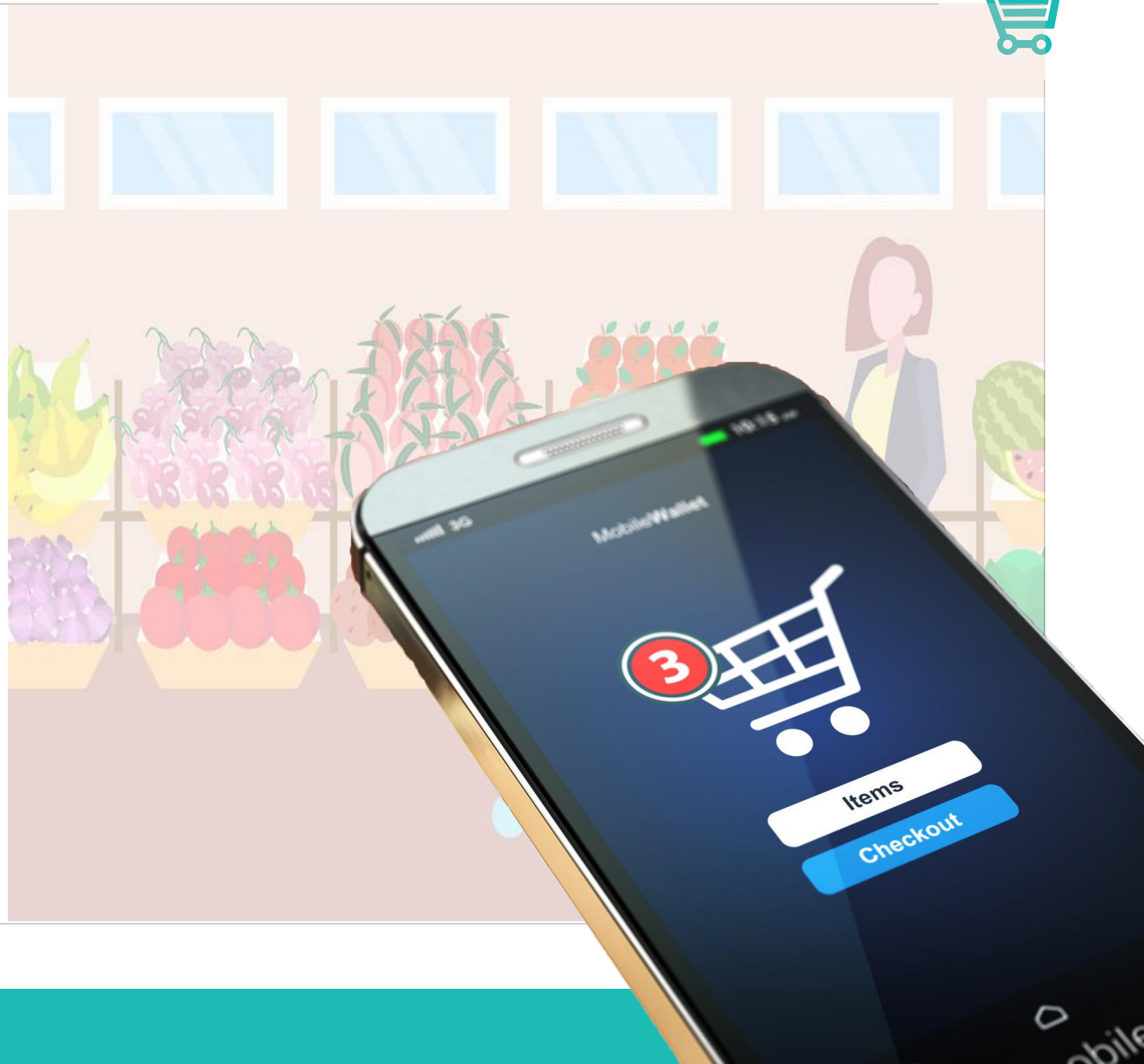# Smart Trolley for Supermarket System

Using Machine Learning and image Processing

IT17095136 | P.Satheesan
IT17037648 | S.Nilaxshan
IT17386296 | R.Thisanthan
IT17033374 | R.Priyanka

2020 - 078

Display
Loyality scanner
Camera
Weight sensor

MobileWallet
3
Items
Checkout

Introduction

- ⚙ Electronic commerce has developed to such an extent to provide convenience, comfort, and efficiency in day-to-day life.

- ⚙ Supermarket is a place where individuals get their everyday necessities[1].
.
- ⚙ Lots of people spending too much of time in the supermarket to purchase their goods.

- ⚙ The study aimed to provide a smart trolley for a supermarket which helps the customers to get benefit through the system.

- ⚙ Techniques such as recommendations, voice assistant, Loyalty customer Program, image processing are used in order to enhance the performance of a smart trolley.

Main Components

01 Loyalty customer Program & Checkout

02 Image Recognition & Weight Sensor

03 Recommending products & location

04 Voice Assistant

Functional Requirement

◆ **Interface Requirement** - The system is capable to accept and transmit the raw data which may be in the form of digital that is numeric values.

◆ **Capacity** - The system is enough capable to hold the data and process it

Non-Functional **Requirement**

◆ **Usability** - The system is user-friendly as it uses a simple networking model like a Zigbee

◆ **Reusability** - The components are compatible for changing environment and supports upgradeability

◆ **Reliability** - The system is highly consistent and reliable

High-Level Diagram
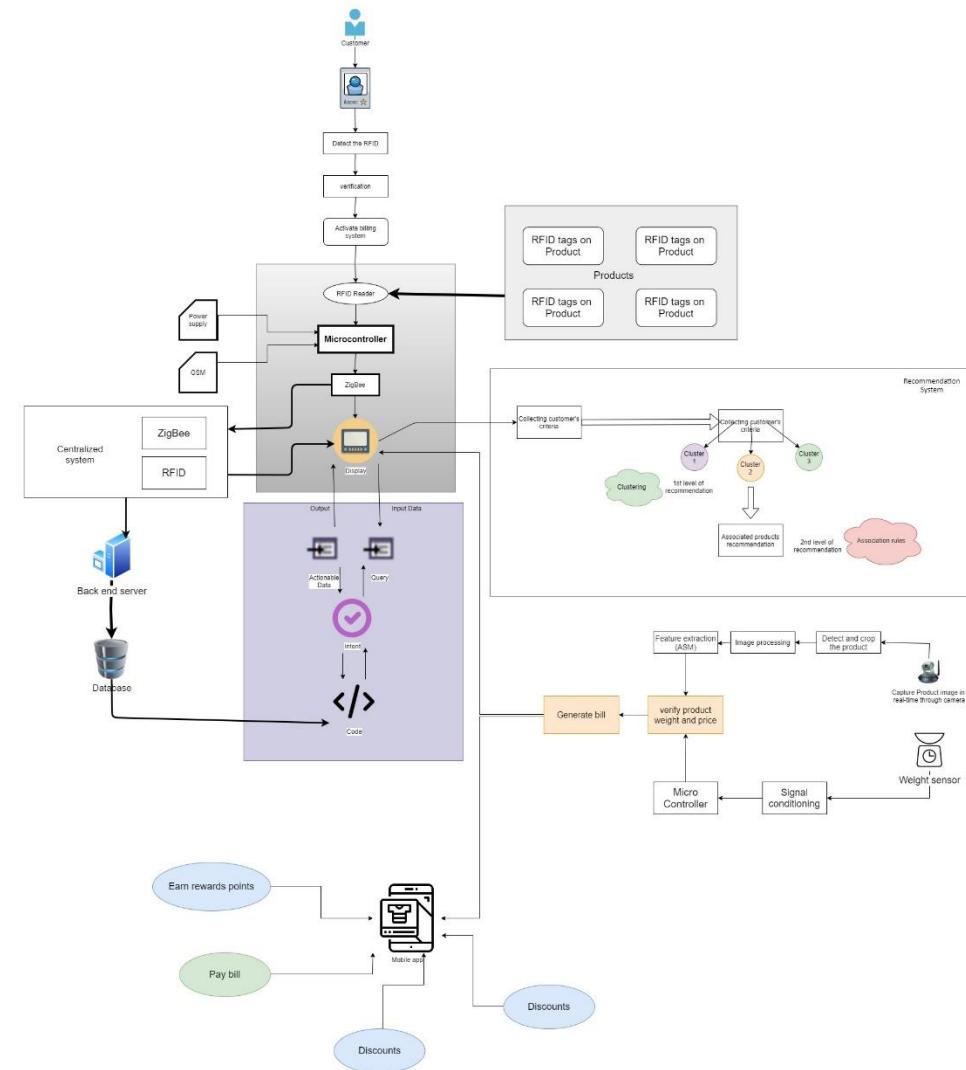
Compare Existing Systems

	Detect product image	Trolley with weight sensor	Recommendation system	Loyalty program	Online payment	Voice assistant
RFID based Smart Trolley	✖	✖	✖	✖	✔	✖
Smart Trolley	✔	✖	✔	✖	✖	✖
Smart Trolley for Supermarket System (our Research)	✔	✔	✔	✔	✔	✔

Loyalty Customer Program & Checkout

Research **Objective**

→ Collect the customer data.

→ Loyalty card wise accessing the trolley

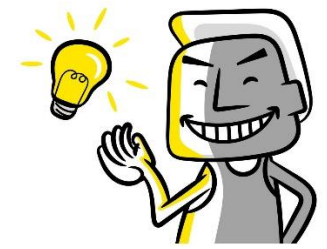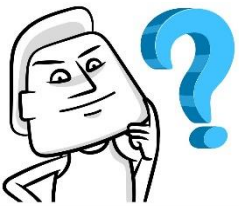→ Loyalty card system wise billing the products.

Knowledge Gap

Research Question

1. How to access the trolley ?

2. What is benefit of using the Loyalty card?

3. How to customer maintain their profile and earn point?

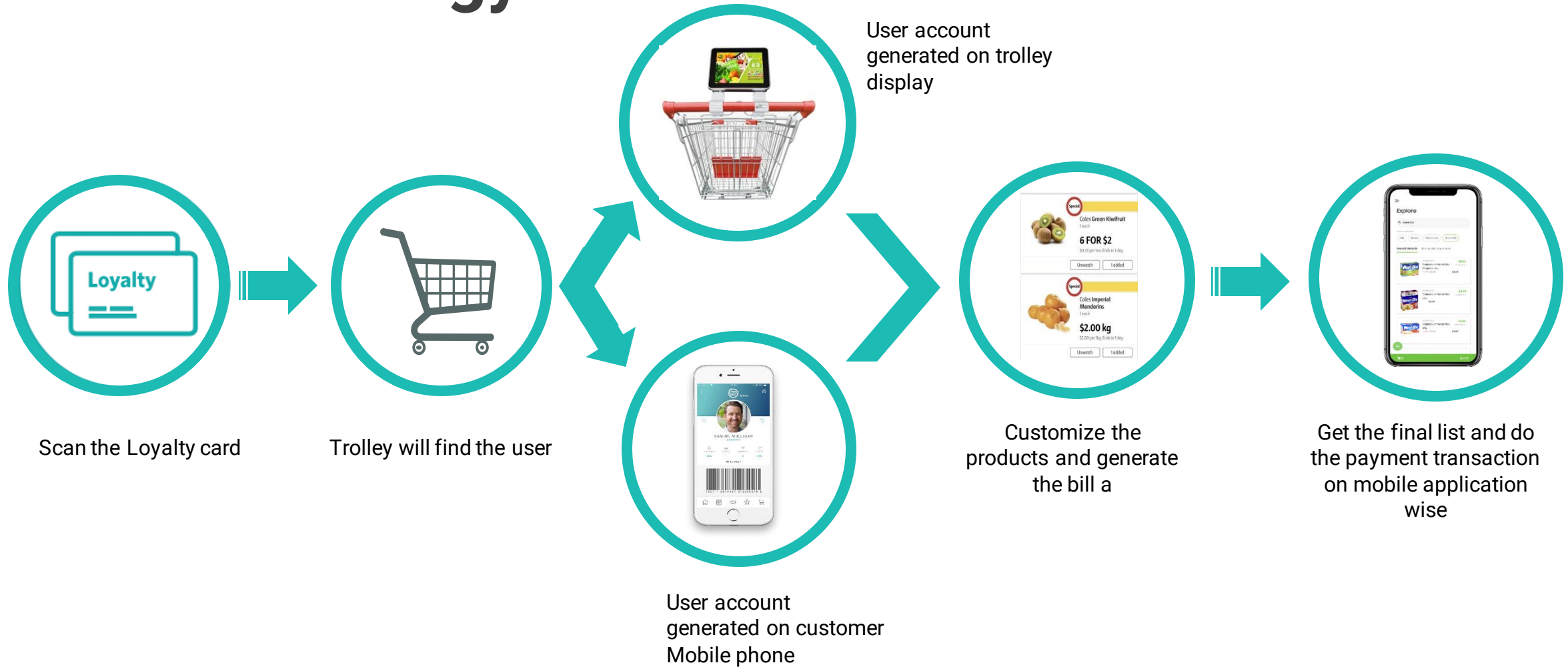4. How to customer do the payment and get the receipt?

Creative Solution

❑ Using the Loyalty card (Have RFID).

❑ Customer can access the trolley. can get points for every shopping. Loyalty customer can easy to know about the discounts and can buy the product in low price.

❑ Using the Loyalty card system.

❑ Loyalty card system wise can do the payment.

Methodology

User account generated on trolley display

Scan the Loyalty card

Trolley will find the user

User account generated on customer Mobile phone

Customize the products and generate the bill a

Get the final list and do the payment transaction on mobile application wise

Technologies

Image Recognition & Weight Sensor

Research Objective

Reduce and eliminate time taken in billing counter in supermarkets

Designing an Intelligent Shopping Basket which uses Image scanners to allow users to self-checkout and increase productivity time
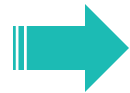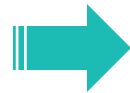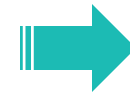
Methodology

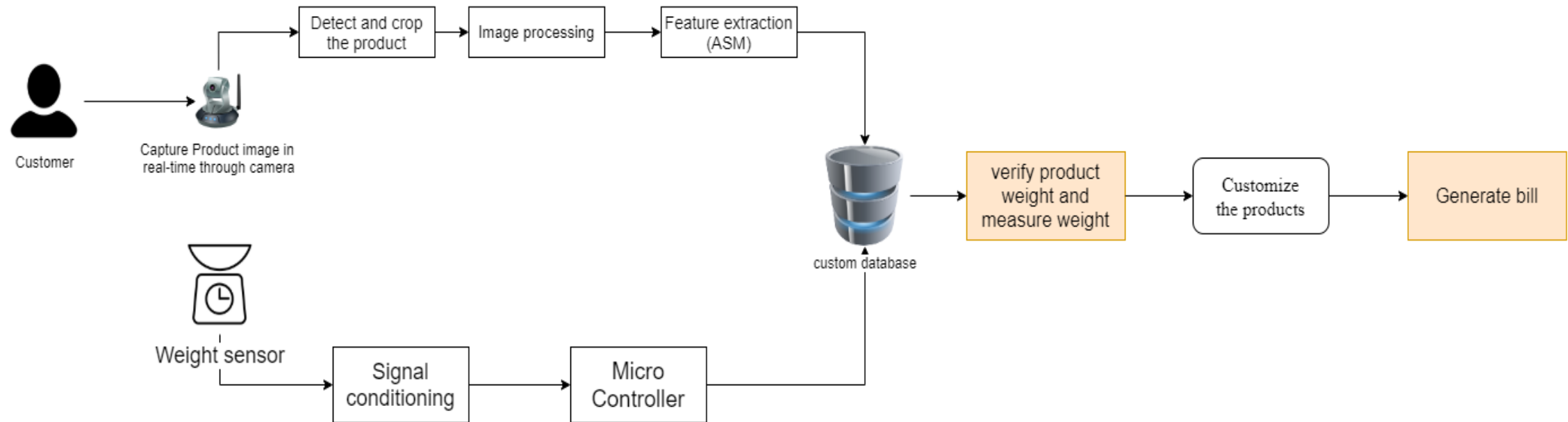Scan the products → Image Processing → Calculate the Weight by weight sensor → Verify Product Price & Weight
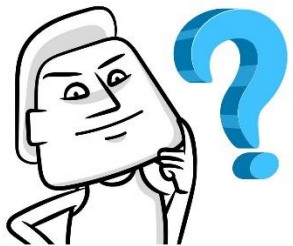
Customize the products

High-Level Diagram

Problem

- ⚙ Need a manpower for billing.

- ⚙ Customer spent more time in billing counter[3].

- ⚙ Mostly we can't find the total cost before billing[7].

Solution

- ⚙ Reduces manpower required in billing section. This can reduce the expenses incurred by the management.

- ⚙ Users can be aware of the total bill amount during the time of purchase.

- ⚙ Reduces time spent at billing counter and Increases customer satisfaction
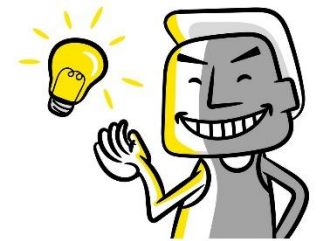
Technologies

Python.
MATLAB

Product Recommendation

Research Problem

- Analyzing customer needs is one of the difficult tasks in the business world today[2].

- Supermarket customers find it difficult to choose products from a large variety of products[3].

- Predict whether or not the customers purchase accessories related to the products they tend to buy[2].

Related Work

	Clustering Products	Clustering Customers	Association Rule Mining
Basket-Sensitive Personalized Item Recommendation	✖	✖	✔
A Product Recommendation system using vector space model and Association Rule	✖	✔	✔
Amazon Recommendation	✔	✔	✖
Development of a recommendation system based on navigational and behavioral patterns of customers in e-commerce-sites	✔	✔	✖
Product Recommendation for supermarket	✔	✔	✔

Research Questions

⚙ How to cluster the products?

⚙ How to cluster the customers?

⚙ How to find the relationship between products?
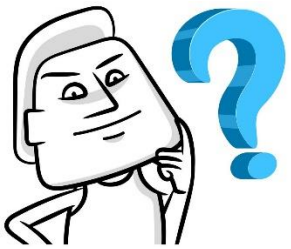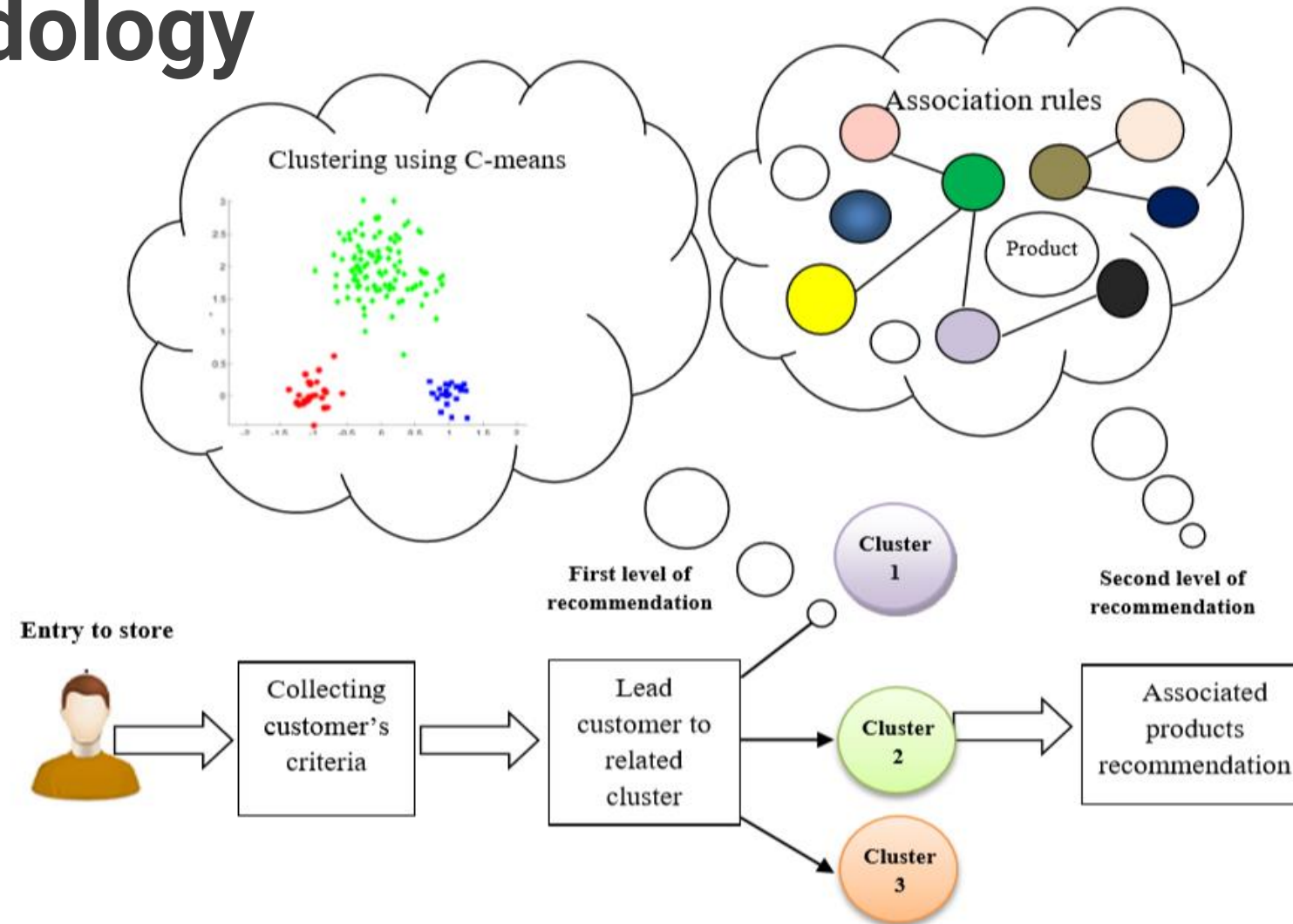
Research Objective

Recommending personalized items to customers and showing the location of that recommended product to prevent customers from searching in confusion and make the customers feel comport while purchasing.

To help customers in selecting suitable products to meet their personal needs.

IT17386296 | R.Thisanthan

Methodology

Two levels of Recommendation

◆ First level of product recommendation is before choosing product where Products are clustered based on purchases and seasonal buying pattern

Customers are clustered using profile built on previous purchases.

◆ The second level of product recommendation is after product selection where potential relationships between products are discovered using association rules mining. At this level, customers select the product, related products are advised to them.

There are three basic types of connection a product recommendation system creates

◆ User-product relationships – based on users' individual product preferences.

◆ User-user relationships – based on similar people (i.e. people of a similar age, background, etc.) likely having similar product preferences.

◆ Product-product relationships – based on similar or complementary products that can be categorized into relevant groups.

Expected Outcomes

Reduce the time of confusion in finding products and make more efficient purchasing decisions through the recommendation system.

Solution

Develop a recommendation system that uses the purchase history of the user and user's behavior of repetition during purchases in a supermarket and suggests real-time personalized items to customers.
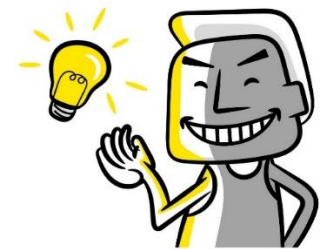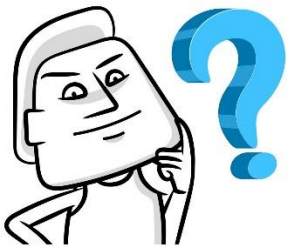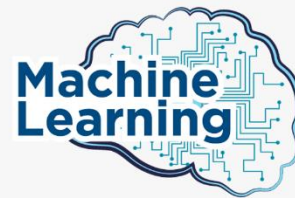
Technologies

Python
Machine learning
GIS(Geographical Information System)

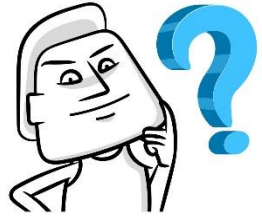# How Voice Assistant is helping to Customers

Research **Objective**

Implementing a voice assistant to support customers

Methodology

Problem

- Customer has to ask queries manually to sales representatives[4].

- Customer doesn't know about promotions and offers[5].

Solution

- Quick reply for customer queries.

- No Need of the Employees support.

Expected Outcomes

Customers get to know about the current period deals or offers.

Technologies

Android
Java

Budget

Item	Cost(lkr)
Weight Sensor	1500
Camera	2000
Arduino	3000
Raspberry pi	5000
LCD Screen	1500
Microphone	800
RFID reader	1200
Others	2000
Total	**17000**

WBS
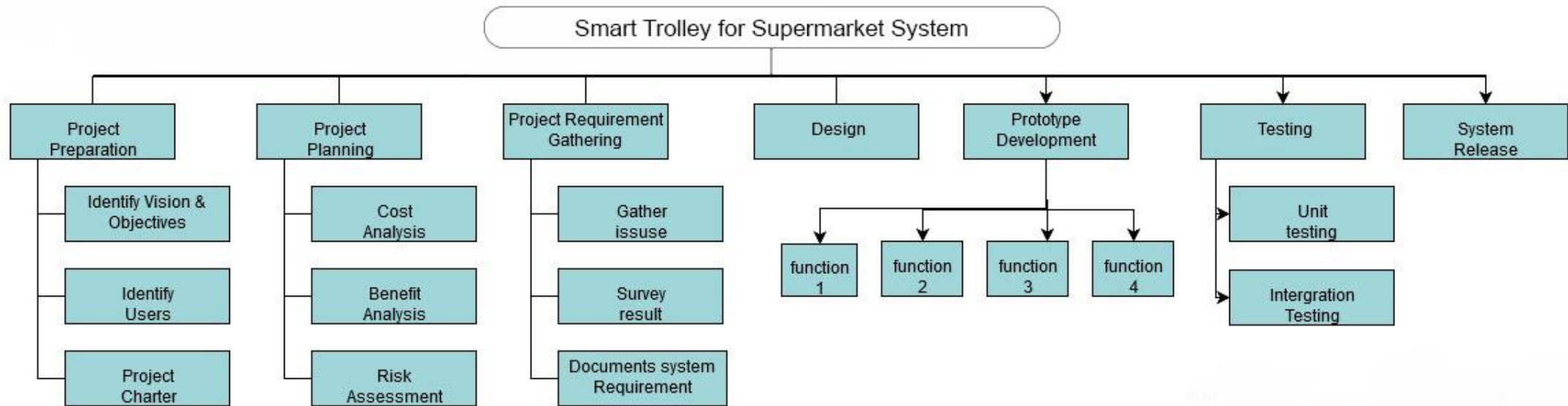
References

1. S. A. K. R. Divya T M, "Modelling of Future Automatic Trolley System based on Sensors and Image Processing Guidance for Supermarket," Department of Electrical and Electronics Engineering , p. 3, 2019.

2. D. M. A. Yahya Dorostkar Navaei, "Dihedral Product Recommendation System for E-commerce Using Data Mining Applications," International Journal of Computer & Information Technologies , p. 23, 2015.

3. K. C. A. S. A. Panayiotis Christodoulou, "A Real-Time Targeted Recommender System for Supermarkets," Department of Electrical/Computer Engineering and Informatics, p. 10, 2016.

4. "Voice Assistant," sentiance, [Online]. Available: https://www.sentiance.com/2018/07/11/motion-voice-assistants/. [Accessed 16 February 2020].

5. "towards data science," [Online]. [Accessed 16 February 2020].

6. A. P. A. G. ,. A. K. M. M. J. ANJALI PERADATH, "RFID BASED SMART TROLLEY FOR SUPERMARKET AUTOMATION," Dept. of Electronics and Communication , vol. 4, p. 6, 2017.

7. N. G. S. K. A. G. Harpreet Singh Bedi, "Smart Trolley using Smart Phone and Arduino," Electrical & Electronic Systems, vol. 6, p. 3, 2017.

Thank you

Q&A