Customer Behavioral Model for Supermarkets

Reference:

- How Do Customers Buy Them at a Supermarket? Behavior Analysis from Real Observation and Agent Simulation
- **Authors:** Masaki Kitazawa, Fumiaki Sato, Takashi Yamada, Masakazu Takahashi, Takao Terano.
- Link for the published research paper.
- Published at Semantic Scholar.

Goal:

To analyse and identify which factor affects sales promotion in supermarkets.

Factors Affecting Sales Promotion

- Shopping list of the customer.
- Possession Money Limit of the customer.
- Staying time of the customer in the store.

About the research paper

This paper has presented a customer behavioral model for grounding the number of purchase items in Agent-Based In-Store Simulator (ABISS)

➔ **Customer's behaviour**
Observing and analysing customers throughout the shopping.

➔ **RFID's**
Radio frequency identification technology is primary component,

➔ **POS**
Point-of-Sales are considered during simulation.

Why Agent based modeling?

- This research paper mainly focuses on actions and behavior of customers and analyse them to increase the sales promotions effectively.

- Since there are multiple agents which interact with other agents and with environment, Multi-agent simulation with decision support comes into picture. Therefore Agent based modeling can be prefered

Real Time Analysis

Overview

- Agents:
  - Customers
  - Products
  - RFID's
  - Carts
  - Cashiers

Overview

- Setup
  - All the carts are attached with the RFID tags.
  - A RFID Antenna is attached at each product category in the market
  - Some RFID Antennas are even installed at survilliances in the store
  - Basically Antenna scans for any RFID tags which passes by it.

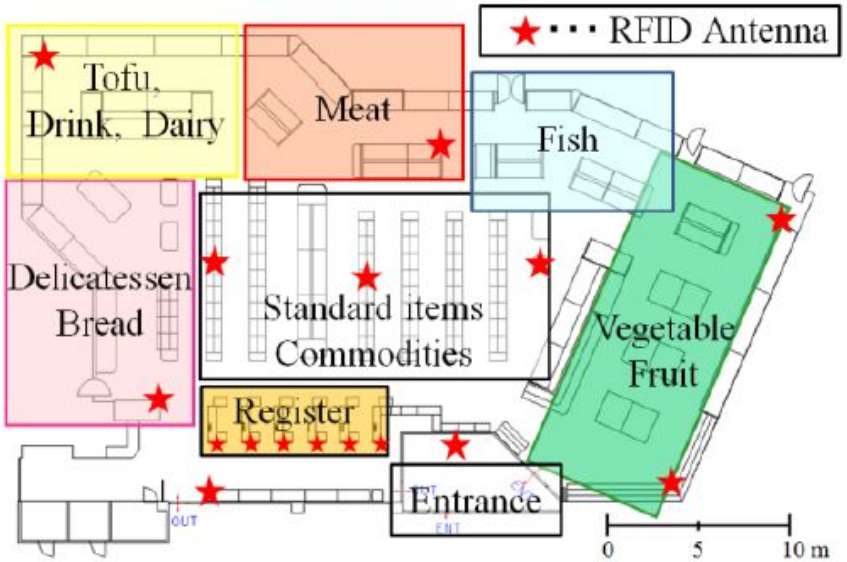


Figure 2. Store Layout and Position of RFID Antenna

Store Layout.

Sections in a store including the RFID antenna locations.

- Here, Register means the cash counter.

RFID tag

(b) RFID Antenna on a Shopping Cart
(banded with white string)
Figure 3. Setup of RFID Antenna

RFID Antenna

(a) RFID Antenna on Display Fixture
(attached the pink cover)

Overview

- Process
  - At the end of the simulation, all of the data which RFID antennas recorded will be submitted at the Main RFID Antenna.
  - The received RFID data will be converted and shown as the path in which the customer travelled with the cart.

Overview

- Process
  - When customer enters into the store, he/she takes a cart to drop products into it.
  - Since each cart is associated with a RFID tag, when the customer moves from one section to another, the RFID antenna will scan the RFID tag and record the respective users path.

Overview

- Process
  - All the products data that the customer purchased will be received at the point of sales.
  - Both the RFID data and the POS data will be used to build the Decision support model.

Overview

- Process
  - The amount of time each customer is spending in the shop is calculated using the RFID on cart starting from start point time to reaching register time.
  - The money spent is calculated by data collected near register.

Modal Analysis

Overview

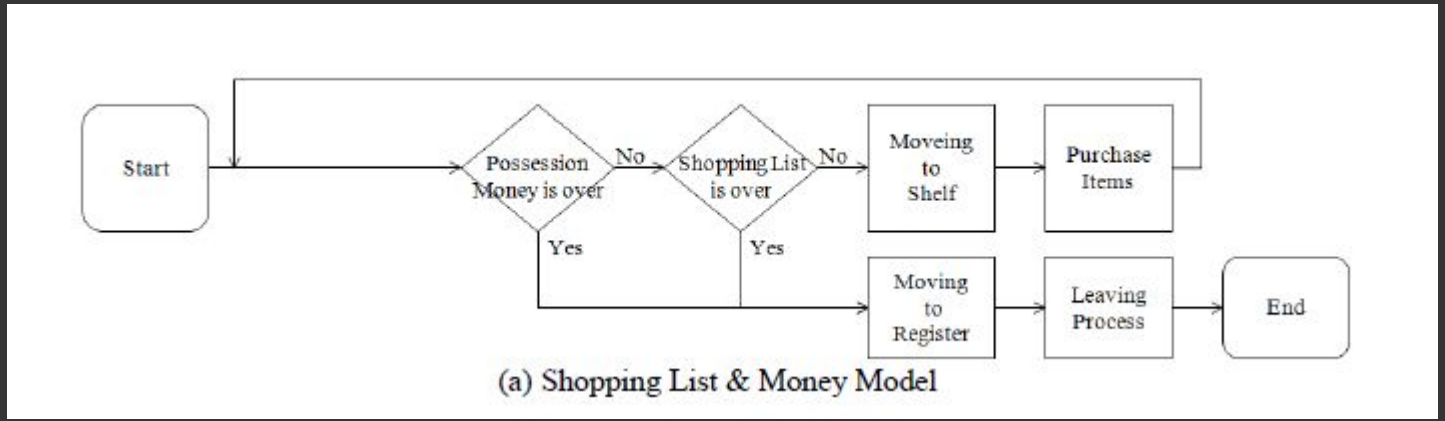
- We will now design our simulation model and run the simulation 3 times each with a unique scenario.

- All the results obtained from this model will be evaluated using the real time analysis results.

- The 3 cases are listed below

Agent types

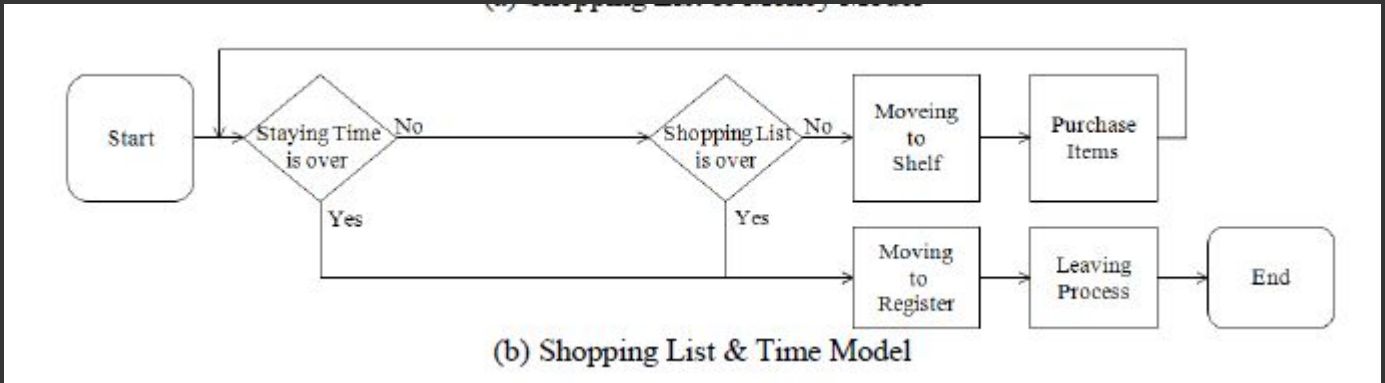
- In this model, customer agents finish shopping when a shopping list and become empty or the amount of purchase money exceeds a budget.



(a) Shopping List & Money Model

Agent types

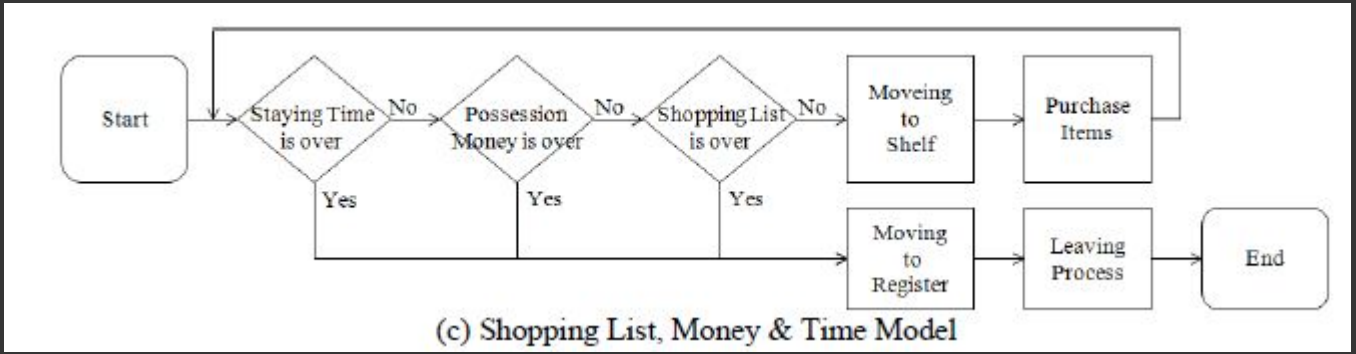
- **Customer agents finish shopping when a shopping list become empty or the staying time exceeds a schedule.**



(b) Shopping List & Time Model

Agent types

- **Customer agents finish shopping when a shopping list become empty, the amount of purchase money exceeds a budget or the staying time exceeds a schedule.**



(c) Shopping List, Money & Time Model

Results

- The output from the above evaluations will decide which factor affects the sales promotion

Improvements

- As of now, we didn't got any ideas for the improvements. While we are building the model we might encounter with some improvements and we will list and implement them.

THANK YOU