

**E-Commerce Technology (F20EC)**

**Coursework 2**

**Ecommerce Website – Bytes Electronics**

**Group 4**

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# 1. Technologies

## 1.1 Website

The website was created using Wix.com. The name of our company is Bytes Electronics. The store sells a variety of electronic products ranging from computers, TVs, cameras and more. The website allows customers to browse and purchase their desired products with easy navigation.

The website can be accessed using the following link:

<https://sk20151.wixsite.com/electronic-store>

The website supports a test account as required by the coursework specification. The test account details are as following:

* Username – [sohamkakra@gmail.com](mailto:sohamkakra@gmail.com)
* Password – anuj1234

## 1.2 Customer Engagement

Customer Engagement is the process by which businesses build on their relationship with their customers to ensure they have a pleasant experience and increase their loyalty to the business. Touchpoints play an important role in customer engagement and increase awareness and product adoption.

## 1.3 Proactive Marketing

Proactive marketing is the process by which businesses take steps to fulfill the needs of customers using marketing strategies such as recommender system, information filtering system etc. Proactive marketing leads to a stronger relationship and gives a competitive advantage which plays a huge role in the success of a business.

# 2. Hypothetical Problem

## 2.1 Customer Engagement Scenario

A sales team employee noticed that the store sees a lot of traffic, but most users are first time users. Users visit once and then do not come back to the store. We have adopted the route of performing a customer churn analysis where we will try to figure out the root of the issue. We will mainly focus on figuring out, ‘Why are customers not returning to the store?’.

## 2.2 Proactive Marketing Scenario

The sales team has noticed that the overall sales rate is declining. It was found that majority of the customers either did not purchase after browsing or purchased only a single product. The aim is to increase the overall sales. We will mainly focus on figuring out, ‘How to increase the sales per customer per transaction?’

# 3. Datasets

## 3.1 Product Dataset

The product dataset has been taken from Kaggle.com. This dataset contains information about electronic products. There are 25 columns that focus on the product’s price, category, stock, brand, manufacturer etc.

The dataset is provided below.

<https://github.com/F20EC-Bytes/BYTES/blob/main/catalog_products.csv>

## 3.2 Customer Feedback Dataset

In order to tackle the issue of customer retention, we coded a small program in Jupyter notebook to predict whether or not a new customer would churn after purchasing a product from the site. This is based on existing data. The dataset of the user is provided below (The same customer churn dataset on canvas).

<https://github.com/F20EC-Bytes/BYTES/blob/main/customersChurn.csv>

# 4. Design and Implementation

The website was created using the online platform Wix. We decided to use Wix due to time constraints. As our main focus was to implement the two technologies, we chose to prioritise our time and energy towards building and implementing those.

## 4.1 Customer Engagement

Attributes or features:

* Price
* Delivery
* Security
* productQuality
* Website
* CustomerService
* Loyalty (chances of them coming back to shop with us)
* Churn (YES or NO)

## 

## 4.2 Proactive Marketing

Our design omits the customerID & nickname columns as that information is unnecessary for training the model. The rest of the dataset is split into 2: (1. Delivery – customerService) & (2. churn), and the data is converted to numeric in both datasets. We then use 70% of the data for training and 30% for testing. The model is trained using the Random Forest algorithm which gave us an accuracy of 71.5%. We plotted a graph to see the importance of each feature on customer churn. The google spreadsheet with new customer(s) feedback data is imported using the spreadsheet URL and the customerID & nickname columns are stored in a separate database for later use, and dropped from the main database. The data in the feedback database is converted to numeric values to match the ones in our training dataset. A for loop is used to iterate through each new user in the feedback database and the churn value is predicted and printed out for each customer along with their nickname and customer ID.

## 4.2 Proactive Marketing

Graphical user interface

Description automatically generated

Attributes:

handleId: This is the ID column

fieldType: This column specifies whether it’s a product or a service

name: This column mentions the name of the product

productImage: This column contains the url of the item image

collection: This column describes the category

ribbon: This column specifies whether the item is on sale, and null if not

price: This column specifies the price of the item

Inventory: This column specifies whether the item is InStock or OutOfStock

productOptionType1: This column specifies how the item is displayed

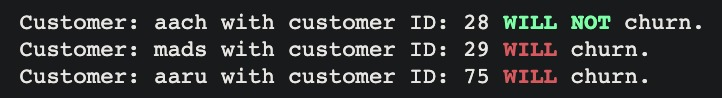
brand: This column specifies the brand of the item

# 5. Solutions and Analysis

## 5.1 Customer Engagement

The customer churn rate is calculated by the formula :

On running Random Forest algorithm and Logistic regression on the user dataset we concluded that the price impacts greatly on whether the user churns. The decision trees generated are based on gini criterion. Since our eBusiness is not by contract, to know that a customer is leaving the company, once the user is done with payment (in cash), the user is asked to fill in a survey - a feedback form (in google forms) based on their opinion regarding the Delivery, price, website, product quality, security, customer service and their loyalty to our electronic store. After submitting the form, the user is provided a link that redirects to the homepage. The data from the forms is saved in a google spread sheet and is accessed in the Jupyter notebook. Then the new user data is cleaned, at the end of which churn is predicted.



The touchpoints in our business are the browsing process of the user on our website, purchasing a product and adding it to the cart & post-customer engagement activities such as surveys.

The attributes Delivery, Price, Website, productQuality, Security, customerService are all used in determining whether a new user would churn (Price being the most impactful). We discarded the features customerID and nickname as they do not affect churn. To retain customers, we could reduce the profit margin of the products on sale and produce offers for multiple products. After running the ML model, we realized that the high prices are the main reason for customers leaving.

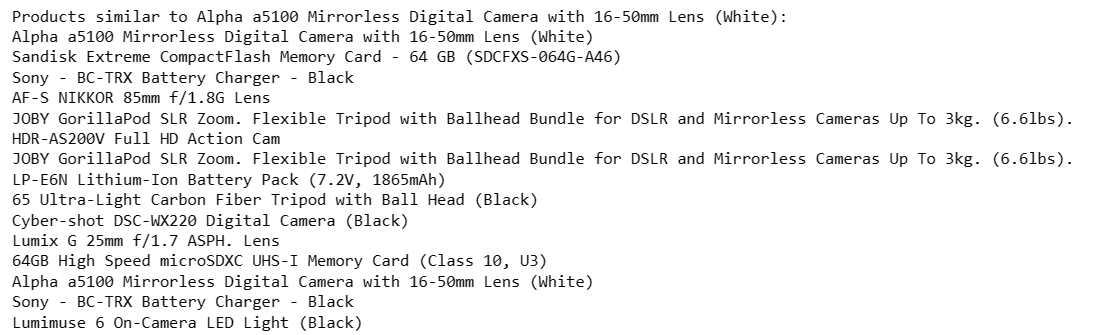
## 5.2 Proactive Marketing – Recommender System

Based on the outcome of the customer churn analysis and our scenario, a possible solution to enhance customer retention was the use of a content-based filtering recommender system that recommends similar products with lower price range. On testing the price based filtering code on Jupyter Notebook, this portion runs successfully, displaying related items at a lower price than the current price (this portion of the code along with the rest can be found on the GitHub link linked on the first page).

In the final version of the website, we implemented the category-based filtering successfully. The algorithm initially uses the **TdidfVectoriser** to convert the collection into numerical. Then it uses **Cosine Similarity** to find the similarity between the products. This was simply done using the *linear\_kernel* function. We then created a series where the index of the dataset is mapped to the product names.

The main recommender function, *recommend\_items\_based\_on\_category()*, takes in a product name as input and returns similar products based on collection. A helper function called *get\_price()* takes the product name as input and returns its price. This is then used to compare the prices of the products in the final list of similar items. The recommender system finally outputs the list of product names whose prices are lower than the current viewing product.





# 6. Reflections

We aimed at displaying related items at a lower price than the currently viewed item. Unfortunately, due to the incompatibility of the python code with the Wix platform, this code could not be implemented in the final website.

As a team, we divided the work equally as groups of 4. Each group focused on implementing one technology used. The members of each sub-group met online using *Microsoft Teams* and in-person whenever possible. We tried to work on the coursework 1-2 hours per week, but probably fell a little short of our target.

We faced difficulty in linking code from Jupyter notebook to Wix, so we fell behind on our schedule and had to drop the python code. We used the Velo Framework API to implement proactive marketing. All members were given access to the website editor, so as to give their inputs for the UI/UX.

# Appendix

**Peer Assessment Form**

**Coursework: Coursework 2**

**Group Number**: 4

**Group Name**: Bytes

**Person who submitted this form**: Taniya

**Submitted Date**: 3/04/2023

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| **Member Name** | **Registered course (e.g. F20xx or F21xx)** | **Work content (e.g. writing up Part 1.a.1)** | **Contribution to the overall coursework (e.g. 12.5%)** | **Any other comments** |
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| **Name 1**  Aachal Davey | F20EC | Customer Engagement, Report | 14% | Worked on the ML model |
| **Name 2**  Aaleen Khattak | F20EC | Report | 2% |  |
| **Name 3**  Aarathi Raju | F20EC | Proactive Marketing, Report | 14% | Worked on the Recommender System Algorithm |
| **Name 4**  Madiha Kazi | F20EC | Customer Engagement, Report | 14% | Worked on the ML model |
| **Name 5**  Sherica D’Souza | F20EC | Proactive Marketing, Report | 14% | Worked on the Recommender System Algorithm |
| **Name 6**  Soham Kakra | F20EC | UI, Report | 14% | Worked on the website and majority report |
| **Name 7**  Varun Senthil Kumar | F20EC | UI, Report | 14% | Worked on the website and majority report |