A Report on

AI Based Personalized Electronic Gadgets Recommendation System

Submitted By

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1. Introduction

1.1 Overview

Today, gadgets have become an individual's essential requirement as a communication and entertainment device all over the world. The technological world has grown more competitive than ever, with many manufacturers striving to offer the greatest products for their clients. The never-ending expansion of the choices space has placed clients in a quandary. Customers were left perplexed by the seemingly limitless number of available alternatives when it came to selecting the best device for them. Customers are influenced by the following aspects when choosing an electronic device to use: brand, RAM, battery life, price, year of release, novel features, personal recommendation, and so on. Even though most electronic devices contain all of the fundamental functionality, manufacturers aim to differentiate their goods by adding some new features to the current features to set them apart from the competition. Manufacturers embraced the challenge and competitiveness of creating the ideal device for their target clients by including creative ideas and features to improve the user experience. The increasing number of brands and models has increased market competitiveness. As a result, consumers have a plethora of alternatives to choose from. Our Internet is flooded with a vast amount of information about electronic gadgets. Hence it is hard for users to get a personalized recommendation about gadgets which can fulfil ll the requirement for the user.

By analysing the mentioned issue an AI based recommendation system will be the feasible solution for this problem. Recommendation system information filtering technique which will provide users the desired information about the electronic gadgets according to their search interest. Recommender Systems create suggestions; the user can accept or reject them based on their preferences, and they can also give implicit or explicit feedback, either immediately or later. Users' activities and input can be saved in the recommender database and utilized to generate new suggestions in subsequent user-system interactions. Because of the economic potential of these recommender systems, several of the largest e-commerce companies (such as Amazon.com and Snapdeal.com) and the online movie rental firm Netflix have made these algorithms a prominent element of their websites. High-quality tailored recommendations enrich the user experience. Web personalized recommendation systems have lately been used to give various forms of individualized information to their respective users. Recommender Systems have boosted the economies of several e-commerce companies such as FANNG, who have made these systems prominent features of their websites.

1.2 Purpose

The purpose is to implement this recommendation system to suggest the desired electronic gadget to the user according to their requirement. It will give sufficient assistance to the user to buy the best electronic gadget. Also it will help the business of electronic gadgets to grow their sphere of influence.

2. Literature Review

2.1 Existing Problem

In the era of digitization, gadgets have become an individual's fundamental necessity as a communication and entertainment instrument. The technology world has become more competitive than ever, with numerous firms vying to provide the best products to their customers. Clients are perplexed by the never-ending increase of the options space. When it came to choosing the right gadget for them, customers were bewildered by the seemingly infinite amount of accessible options. When selecting an electronic gadget to use, customers are affected by the following factors: brand, RAM, battery life, price, year of release, unique features, personal recommendation, and so on. Despite the fact that most electronic gadgets have all of the basic capabilities, manufacturers strive to differentiate their products by adding some new features to the existing features to set them apart from the competitors. Manufacturers accepted the challenge and competitiveness of developing the best gadget for their target consumers by including innovative ideas and features to enhance the user experience. The growing number of brands and models has heightened market competition. As a result, customers have a wealth of options from which to pick. Our Internet is filled with a wealth of information regarding electrical devices. As a result, it is difficult for users to receive individualised recommendations on products that can meet their needs.

2.2 Proposed Solution

The model will take product name as an argument and give the top five recommendation using content based filtering approach. Content-based filtering uses item features to recommend other items similar to what the user likes, based on their previous actions or explicit feedback. The model will interact with user interface made by html and css and connected with flask.

CONTENT-BASED FILTERING

Read by user

Similar articles

Recommended to user
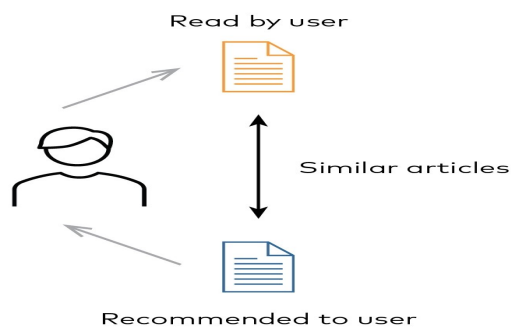
3. Theoretical Analysis
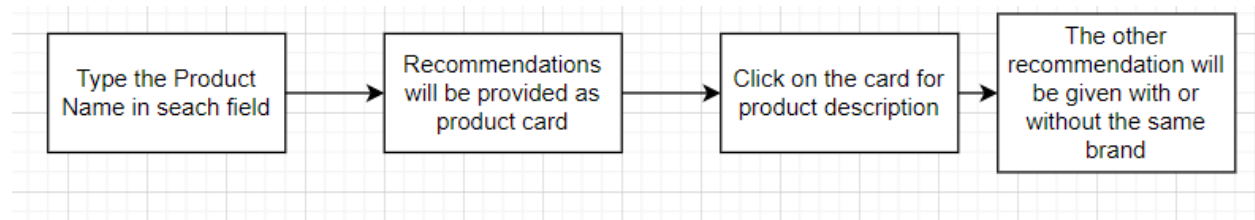
3.1 Block Diagram

Fig 3.1.1:Block diagram for Proposed recommendation application

3.2 Hardware / Software designing

- **Front-end:**

   For front-end we are using react.js framework. React is an open source, JavaScript library for developing user interface (UI) in web application. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript. Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. CSS is designed to enable the separation of presentation and content, including layout, colourss, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

- **Back-end:**

   For back-end we are using python. Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. It is also the high demand language for machine learning and data science based projects. The libraries like flask can be used to connect web pages with python based machine learning models.Flask is an API of Python that allows us to build up web-applications. It was developed by Armin Ronacher. Flask's framework is more explicit than Django's framework and is also easier to learn because it has less base code to implement a simple web-Application. Flask is based on the WSGI (Web Server Gateway Interface) toolkit

and Jinja2 template engine.

Also to run model we are using juster notebook.The Jupyter Notebook is the original web application for creating and sharing computational documents. It offers a simple, streamlined, document-centric experience. program used to mix code, comments, and visualizations in an interactive document called notebook that can be shared, reused, and reworked in a web browser. Jupyter Notebook (formerly IPython Notebooks) is a web-based interactive computational environment for creating notebook documents. A Jupyter Notebook document is a browser-based REPL containing an ordered list of input/output cells which can contain code, text (using Markdown), mathematics, plots.

4. Experimental Investigation

Sr.no	Paper Name	Author	Findings
1	A Gadget Recommendation System using Data Science	A Pushpalatha*, Harish Sanmugam J, Jeya Pradeepa, Madhu Bala S	They have developed an AI-based recommendation system tailored specifically for electrical devices. It offers a basic user interface with several functions. They gathered a diverse set of data and sanitized it with data pre-processing. Then, utilizing a wide variety of acquired data, we particularly customized the K-means algorithm to fit the user input.
2	A Movie Recommender System: MOVREC	Manoj Kumar, D.K.Yadav	The proposed system have developed Movie recommendation system using K means algorithm by sanitizing the content through count vectorization.

			It also calculates the cosine similarity metrics.
3.	Online Book Recommendati on System	Nursultan Kurmashov, Konstantin Latuta , Konstantin Latuta	The recommender system focuses on simplicity and speed. The user makes a registration and is asked to select 10 favourite books from at least 3 categories (genres) Based on this information the system makes recommendations. A user can continue to rate the books, buy them and add them to read list and thus allow the quality of recommendations to improve.

5. FlowChart
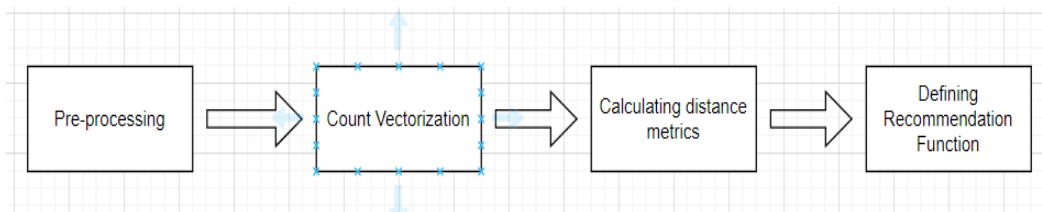
- Pre process the data:
  - To fit into the model there is the need to convert the data into desired format.
  - The product_name,brand and model are converted into tags and merged into one column.
  - Rest unnecessary attributes like price , ratings,user_Id are removed.

- Count Vectorization:

    - Count Vectorization is used to transform a given text into a vector on the basis of the frequency (count) of each word that occurs in the entire text.
    - We are also using the concept of Count Vectorization to convert tags into vectors
- Calculating Distance metrics:
    - Cosine Similarity will be the best algorithm to calculate distance between vectors.
    - In data analysis, cosine similarity is a measure of similarity between two sequences of numbers.
    - For defining it, the sequences are viewed as vectors in an inner product space, and the cosine similarity is defined as the cosine of the angle between them, that is, the dot product of the vectors divided by the product of their lengths.
    - It follows that the cosine similarity does not depend on the magnitudes of the vectors, but only on their angle.
    - The distance will be calculated for all the vectors.
- Defining recommendation function:
    - After converting to vectors and calculating the distance, a recommend function is defined.
    - The function will match product name with the indexes in dataframe and fetch the tags.
    - Than it will calculate similarity of those tags and recommend top five products whose tags are nearest to the original product tags.

6. Result

```
recommend('Nikon D7200 DSLR Camera (24.2MP, Black)')
```

```
Product_Id                                    0528881469
Picture URL         https://i.gadgets360cdn.com/products/cameras/l...
Product Name               Nikon D3400 DSLR Camera (24.2MP, Black)
tags               nikon d3400 dslr camera (24.2mp, black) d3400 ...
Name: 22, dtype: object
Product_Id                                    0528881469
Picture URL         https://i.gadgets360cdn.com/products/cameras/l...
Product Name               Nikon D5600 DSLR Camera (24.2MP, Black)
tags               nikon d5600 dslr camera (24.2mp, black) d5600 ...
Name: 33, dtype: object
Product_Id                                    0594033896
Picture URL         https://i.gadgets360cdn.com/products/cameras/l...
Product Name               Nikon D5500 DSLR Camera (24.2MP, Black)
tags               nikon d5500 dslr camera (24.2mp, black) d5500 ...
Name: 54, dtype: object
Product_Id                                    0594481813
Picture URL         https://gadgets.ndtv.com/static/icons/cameras....
Product Name               Nikon D3300 DSLR Camera (24.2MP, Black)
tags               nikon d3300 dslr camera (24.2mp, black) d3300 ...
Name: 113, dtype: object
Product_Id                                    0594033896
Picture URL         https://gadgets.ndtv.com/static/icons/cameras....
Product Name               Nikon D3500 DSLR Camera (24.78MP, Black)
tags               nikon d3500 dslr camera (24.78mp, black) d3500...
Name: 53, dtype: object
```
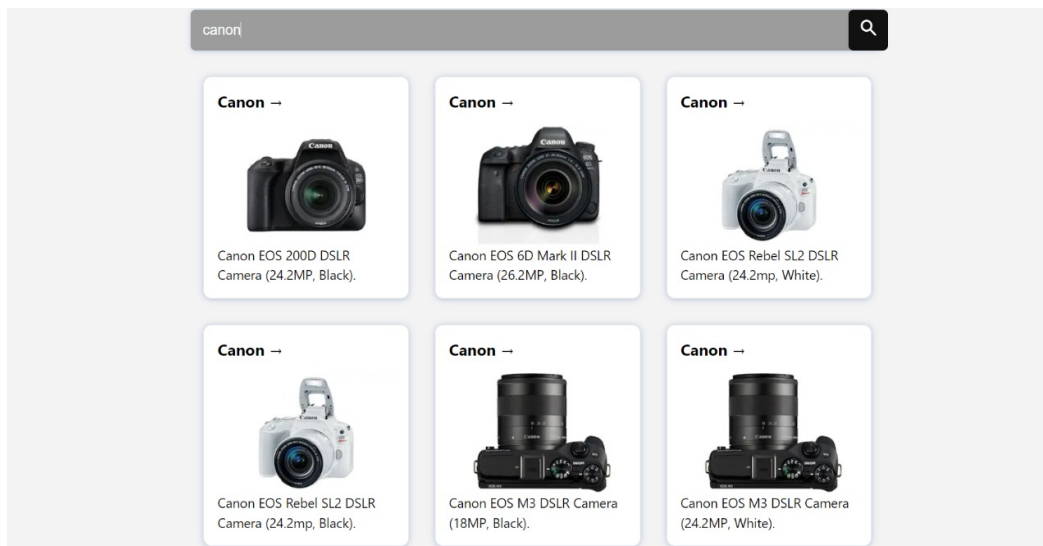

canon

Canon →
Canon EOS 200D DSLR Camera (24.2MP, Black).

Canon →
Canon EOS 6D Mark II DSLR Camera (26.2MP, Black).

Canon →
Canon EOS Rebel SL2 DSLR Camera (24.2mp, White).

Canon →
Canon EOS Rebel SL2 DSLR Camera (24.2mp, Black).

Canon →
Canon EOS M3 DSLR Camera (18MP, Black).

Canon →
Canon EOS M3 DSLR Camera (24.2MP, White).

Canon

Canon EOS 200D DSLR Camera (24.2MP, Black)

Model :- EOS 200D 24.2MP DSLR Camera

₹ 59,999

Recommended Products

☑ Include Same Brand (Canon)

Canon →

Canon EOS 200D DSLR Camera (24.2MP, Black).

Canon →

Canon EOS 750D DSLR Camera (24.2MP, Black).

Canon →

Canon EOS 760D DSLR Camera (24.2MP, Black).

Canon →

Canon →

Canon →

Canon

Canon EOS 200D DSLR Camera (24.2MP, Black)

Model :- EOS 200D 24.2MP DSLR Camera

₹ 59,999

Recommended Products

☐ Include Same Brand (Canon)

Nikon →

Nikon D7200 DSLR Camera (24.2MP, Black).

Nikon →

Nikon D3400 DSLR Camera (24.2MP, Black).

Nikon →

Nikon D5600 DSLR Camera (24.2MP, Black).

Nikon →

Nikon →

Nikon →

7. Advantages & Disadvantages

7.1 Advantages:

- It can recommend the gadgets with any key word related to product which user is wishing for.
- It can give extra information about the product by clicking on recommended card.

7.2 Disadvantages:

- It can't recommend the gadgets according to user's ratings given to the product.
- As the react app is just a showcase of recommendation engine working user can't by the product.

8. Applications

- Can be applied in e-commerce website which are concentrate on electronic products to enhance its business.

- Can recommend electronic gadgets like Camera,T.V,Laptop,Gaming Consoles, headphones,speakers,etc.

9. Conclusions

Machine learning techniques are used to gather and retain data about each device and user in order to establish a link between those users and the gadgets. A user preference technique was used in this work to pick gadgets. Thus, in the realm of personalized recommendation systems, the critical issue of determining what device users require to enhance and satisfy their specific needs from in-depth personalization services has been resolved. The findings indicate that a gadget suggestion system may significantly improve service quality.

Electronic devices have become indispensable in meeting people's fundamental needs. Because of technological advancements, it is now important to meet various functional demands of end-users. As a result, it is critical to recommend devices to clients based on their unique preferences. With the fast advancement of technology, smart gadgets and communication networks have sprung up to cover every part of customer behaviour. These data may also be taught and modelled for future usage in order to deal with potential technological advances.

10. Future Scope

- The model can also integrate the collaborative filtering approach.
- In the future the model can be updated into a deep learning project using LSTM .
- Furthermore the website can convert to mobile application and can use camera settings for image based recommendation.
- The audio processing can also be used to fetch the key words from audio and match the recommendations in the model.

11. Bibliography

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3. *Kurmashov, Nursultan & Latuta, Konstantin & Nussipbekov, Abay. (2015). Online book recommendation system. 1-4. 10.1109/ICECCO.2015.7416895.*