RECOMMENDATION SYSYTEM USING MACHINE LEARNING

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ABSTRACT :

A recommendation system plays a very important role in our day to day used application specially in e commerce website and many social media apps. Role of recommendation system is to suggest the users to select the products easily and provide more information related to us. This is the world of internet so we have a huge amount of useful data to generate an recommendation system by creating a model using Artificial Intelligence and Machine Learning. The research paper represents the Approaches and techniques which are used in recommendation system.

INTODUCTION

The Artificial Intelligence and machine learning technology are leading in world- wide and used in every sector of industry and day to day used products. The recommendation system is one of the most useful application of machine learning algorithm to recommend the products for the people where they have interest on it. The Recommender system helps to find out the best choice of item required on ecommerce sites. Many ecommerce sites like myntra ,amazon, flipkart and many more are use the recommendation system for the better experience of user and also grow their sales by suggesting the similar products related to the what they have search .

So overall we can say that a recommendation system using a machine learning algorithm help the people to suggests the products easily and also make the ecommerce sites more helpful.

Approaches of Recommendation System:

1. Collaborative Filtering Recommendation system
2. Content based Recommendation system
3. Hybrid Recommendation system
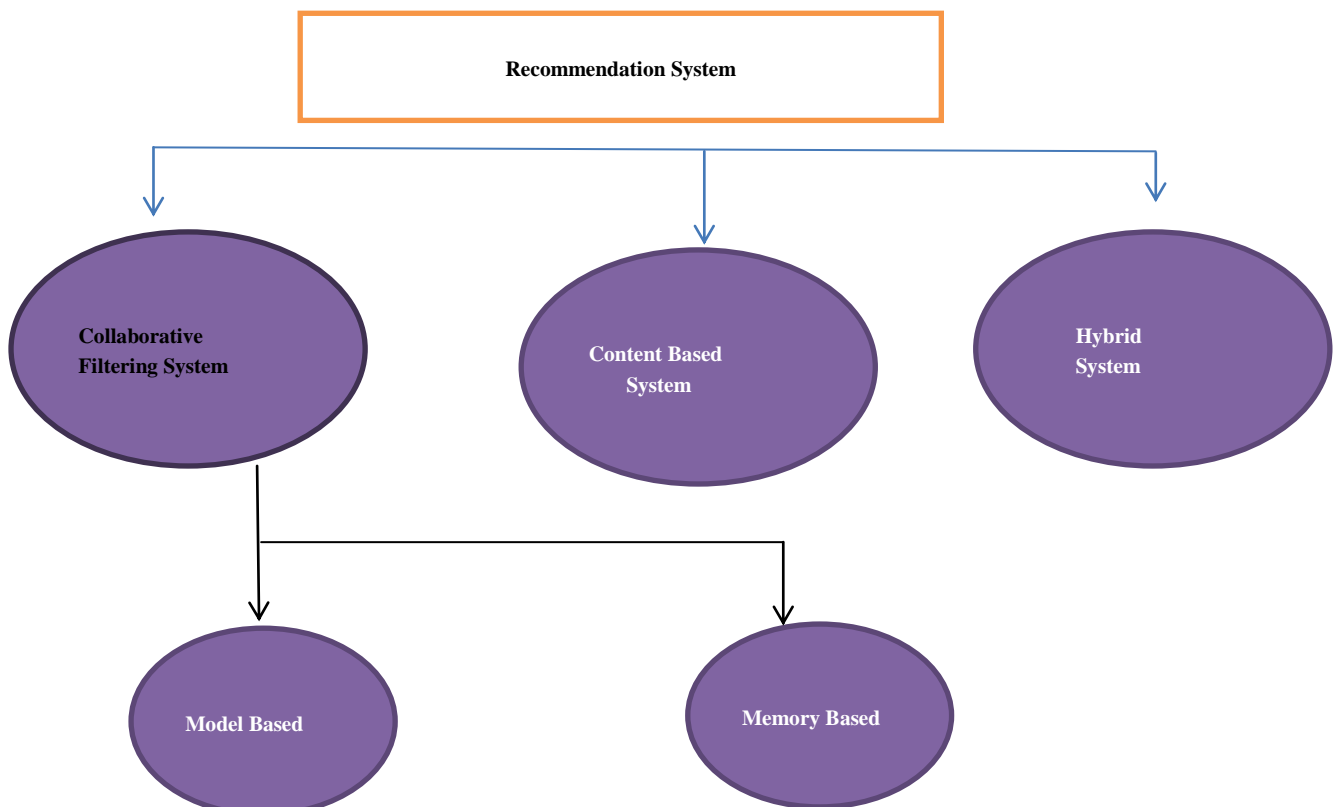
III. Collaborative Filtering system :

A collaborative advice device is a effective device for imparting customized recommendations to users based on their possibilities and behaviors. It operates by using leveraging user interactions and comments to identify patterns and advocate gadgets of interest. This method has a wide variety of packages, which include e-trade, content streaming, and social networks. Basically a Collaborative filtering Recommendation systems recommend- an item to a user based on the perspective of other users. Like in a movie based recommendation system it shows the movies to user which is also liked by other user or we can say that a group of people liking the same movies.

Implementing a collaborative recommender system typically involves three main steps .

Steps: Data collection, user element matrix creation and recommendation generation.

1. **Data Collection**: Collect user interactions, such as comments, clicks or purchases, etc. compile into structured dataset.
2. **User-Element Matrix**: Create a matrix where the rows represent users and the columns represent columns Items, each cell stores the user's interaction with the item (e.g. rating or binary). index).
3. **Recommendation Generation**: It calculates similarities between users or items based on a matrix and uses these similarities to generate recommendations to users. Common techniques include user-based collaborative filtering and item-based collaborative filtering.

- **Model-based collaborative System**:- The system is a powerful tool for delivering personalized products or content Advice to users. Analysis using mathematical models and algorithms User behavior and item attributes to predict what users might like their preferences and those of similar users. This approach helps overcome commonalities Limitations of storage-based systems, such as: Scalability and sparsely issues.

   These systems have a wide range of applications in various industries. In e-commerce, they improve user experience by recommending products based on past purchases and browsing history, thereby increasing conversion rates and sales. For streaming services, they recommend movies or songs to motivate users and reduce churn. They are also used to recommend friends or contacts on social networks, to personalize content on messaging platforms, and to recommend relevant job opportunities on job portals.

   By analyzing large datasets and understanding user preferences, model-based collaborative recommendation systems not only benefit businesses by increasing user engagement and revenue, but also create more customized and enjoyable experiences. has become an essential part of modern online services.

- **Memory-based collaborative System**:- A valuable tool for providing users with individualized recommendations based entirely on their interaction history and other users' preferences is a memory-based, fully collaborative advise gadget. As opposed to version-primarily .Unlike structures, memory-based systems no longer depend on intricate mathematical models or algorithms; instead, they employ a reliable method to identify consumer similarities and recommend products mostly based on the actions of comparable users.

   E-trade platforms are one typical use case for memory-based, fully collaborative recommendation systems.

   They make use of the surfing and buy records of customers to signify products that others with comparable possibilities have favored. In social networks, these structures endorse pals or connections through analyzing mutual connections and interactions. They also are utilized in film or track streaming services to suggest content material primarily based on user ratings and viewing records.

   Memory-based totally structures are quite simple to put into effect and interpret, making them user-friendly. They excel in scenarios wherein statistics is sparse and offer actual-time hints. While they'll not scale in addition to version-based totally structures, they are effective for smaller to medium-sized person bases and provide a valuable manner to decorate user reviews by way of presenting personalized content material and connections.

IV. Content Based System:-

A content material-based totally recommendation gadget is a effective tool for imparting personalized guidelines to customers primarily based at the attributes and features of gadgets and the user's options. This machine often focuses on reading the content or characteristics of the gadgets and matching them with person profiles. A content material-based totally recommendation gadget, frequently used in conjunction with collaborative filtering, is a popular method for handing over personalized pointers to customers in numerous domain names. It is based on the inherent traits or attributes of objects and consumer preferences, making it a valuable device in situations where user-object interactions are sparse or there's a need for a diploma of transparency in recommendations.

In e-commerce, content material-based systems leverage object functions consisting of product category, logo, rate, and textual descriptions. For instance, if a consumer often browses electronic devices, the device can propose similar merchandise with matching attributes. This is in particular beneficial for brand new or niche items with restrained interplay records. One venture in content-based structures is the potential for over-specialization, wherein suggestions are too much like a person's past interactions, restricting serendipity. To cope with this, hybrid advice systems frequently integrate content-primarily based and collaborative filtering tactics to provide a more well-rounded and numerous advice enjoy.

In précis, content material-based totally recommendation systems are versatile equipment that leverage item attributes and consumer options to offer customized guidelines in e-trade, content structures, and entertainment services. They are in particular powerful in cases with confined user interaction data, providing users with applicable and tailor-made recommendations based totally at the intrinsic characteristics of items.

Implementation:

- **Item Profiling**: Begin by using growing distinctive profiles of objects. For example, in an e-commerce setting, these profiles would possibly encompass attributes like product class, price, emblem, and consumer-generated tags or descriptions.

- **User Profiling**: Develop consumer profiles by way of considering their historical interactions, scores, and preferences. You can constitute users and items in a vector area, wherein each size corresponds to an item feature or consumer preference.
- **Feature Extraction**: Use techniques like Natural Language Processing (NLP), text analysis, or picture popularity to extract applicable features from textual content or snap shots, depending at the form of objects being recommended.
- **Matching Algorithm**: Employ algorithms that calculate the similarity among person profiles and item profiles. Common methods consist of cosine similarity, TF-IDF (Term Frequency-Inverse Document Frequency), or machine mastering models.
- **Ranking and Recommendation**: Based on the calculated similarity rankings, rank the objects and recommend the pinnacle-rated ones to the consumer. You can use a threshold or ranking approach to filter out and gift the maximum relevant items.

V. Hybrid recommendation system :-

A hybrid recommendation system combines the strengths of various advice approaches, normally collaborative and content-based filtering, to offer greater correct and numerous recommendations. This integration permits the device to triumph over the constraints of character techniques, leading to stepped forward overall performance and a more complete recommendation experience for customers.
Uses:
E-commerce and Retail: Hybrid advice structures are widely hired in e commerce systems to provide personalized product hints to customers. By leveraging collaborative and content material-based filtering, these structures can propose items that aren't simplest similar to the consumer's alternatives however also percentage comparable attributes, main to more accurate and relevant guidelines.

- **Streaming Services**: In the amusement enterprise, hybrid advice structures are used to recommend films, TV indicates, or song to users based on their watching or listening history, in addition to the content material features of the items. This approach guarantees that customers get hold of guidelines that align with their tastes while also introducing them to new and numerous content.
- **News and Content Platforms:** News aggregators and content material platforms utilize hybrid advice systems to signify articles, motion pictures, or other content material primarily based on both consumer options and the content material capabilities of the items. By thinking about each the person's ancient interactions and the attributes of the content material, those systems can provide a customized and tasty content discovery revel in.

Implementation:

Implementing a hybrid advice gadget includes integrating collaborative and content-based totally filtering techniques in a complementary way. This commonly consists of:

- **Data Preprocessing:** Collect and preprocess user-item interplay data, in addition to item content material statistics**.**
- **Feature Extraction**: Extract applicable features from both person-item interaction statistics and object content statistics, which includes item attributes, consumer choices, or textual facts.
- **Model Integration:** Develop a method for combining the outputs of collaborative and content material-based totally filtering models, which could contain weighted averaging, cascading, or function combination techniques.
- **Evaluation and Testing**: Evaluate the overall performance of the hybrid gadget using metrics which includes accuracy, diversity, and novelty. Conduct thorough trying out to ensure that the gadget is supplying great hints**.**
- **Feedback Incorporation:** Incorporate person remarks to continuously update and enhance the hybrid advice machine, making sure that it adapts to changing user choices and behavior over time.
  By leveraging the strengths of each collaborative and content-primarily based filtering, hybrid recommendation structures can offer customers more accurate, diverse, and personalized pointers across various domain names, leading to multiplied consumer engagement, pride, and retention.

Overall we can say implementing any model behalf of machine learning took five to six common steps which are data gathering, data preprocessing, data analyze, select the model, train the model, test the model and the last step is deployment.
In recommendation system using machine learning we can select python as programming language because of its easy environment and having all libraries regards to use in machine learning model.

Most used python libraries in machine learning:

- Numpy Module
- Scikit-learn
- Theano
- Keras
- PyTorch
- Pandas Module
- Matplotlib
- Scipy
- TensorFlow

VI. Conclusion

So we discuss about varies type of recommendation system methods include collaborative filtering, content based filtering and hybrid recommendation methods. As we know that the recommendation system impact in varies application of ecommerce sites, social media application and many more. A good and powerful recommendation system helps the people to recommend them relevant topics and help the ecommerce sites to grow their business. In this paper it also discuss about the implementation part various recommendation system and the most used libraries of python for machine learning.

VII. REFERENCE :

[1]. Brent Smith, Greg Linden, and Jeremy York,"Amazon.com Recommendations Item-to-   Item Collaborative Filtering".

[2]. Neil Hurley ,Zunping Cheng," Effective Diverse and Obfuscated Attacks on Model-based   Recommender Systems"

[3]. Meenakshi Sharma and Sandeep Mann, "A Survey of Recommender Systems: Approaches and Limitations" ,ICAECE2013

[4]. Kumari Priyanka, and Anand Shanker, "Book Recommendation System Based on Collaborative Filtering and Association Rule Mining for College Students",.

[5]. Vishal Patel and Yagnesh Patel, Vishal Patel, International Journal of Engineering Development and Research Volume 3, Issue 4, 2015, pp 696-700.