RECOMMANDER SYSTEM FOR PRODUCT PROMOTION THROUGH PCA, DWT AND PCA

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***Abstract*—Preserving Environment is critical as the impact of pollution is harming the environment. To this end, these paper present different methodologies used to promote green products. Green products promotion with recommender system takes into account different parameters. These parameters includes Energy Saving, Wire used, cost, carbon emission, CO2 emission etc. This paper takes into account both content as well as collaborative filtering mechanism. to come to the conclusion, collaborative filtering produce best possible results. The metrics considered for evaluating best approach includes classification accuracy, sensitivity and specificity.**

Keywords—Recommender System, Classification accuracy, specificity, sensitivity, filtering

I. INTRODUCTION

Recommender system is being used by almost every company to promote the product through online resources. Online social media serve as great platform to promote the products and increase sale of products. [1]With merits, online social media also comes with the demerits. It is close to impossible to identify right product with decent cost from millions of product. To detect only reliable products that do not harm the environment, Recommender system is very useful.

Next thing that is important for detecting green products is parameters that are listed on the product itself. These parameters are critical in determining whether product is green or not. [2]These parameters include CO2 emission, Carbon emission, Material used, energy consumed and cost. Each parameter is assigned with the threshold value. [3]In case product parameter list values greater then threshold value, product is identified as Green and considered for promotion. [4], [5]This paper present the comparison of content as well as collaborative filtering along with techniques used within recommender system including principal component analysis, discrete wavelet transformation and singular valued decomposition.

Rest of the paper is organised as under: section 2 gives the literature survey describing the techniques used for product identification along with content and collaborative filtering, section 3 gives the information about the metrics that could be used to identify green products correctly, section 4 gives problem definition that serve as criteria for future modification to existing mechanism, section 5 gives the proposed methodology and last section gives the conclusion and future scope.

II. LITERATURE SURVEY

This section presents way pf methodology explanation used within existing literature. The literature is presented by highlighting the technique and then describes the result generated from the technique.

A. PCA

Principal Component Analysis is used in order to extract the features from the dataset. These features are then categorised into critical and non-critical parts. Critical parts expressed in the form of highest correlation. [6], [7] discussed PCA along fuzzy based mechanism for categorizing the product as Green or not. Fuzzy rules were formed for making decision regarding product promotion. Result of the proposed inference model was expressed in the form of classification accuracy that was sufficiently high and in the range of 90%. The methodology for the same is given as under

PCA-(Recommender System)

- Input Dataset
  Data=extract(Database)
- Calculate Correlation
  Corr[i]=correlation(Attribute(Data))
- Calculate highest correlation attributes
  Max[j]=max(Corr)
- Corr_Matrix=Max[j]
- If(Product_Attributes>Corr_Matrix)
  Categorise Green Product
  Else
  Analyse next product
  End of if
- Output classification accuracy

This mechanism identifies the highest correlated attribute and then classify product into green or normal product.

B. Discrete Wavelet Transformtion

DWT provides modular approach for the extraction of the features from the dataset. Extracted features will be used to categorise the product into green or normal. [8] [9]discussed the latest trends in product promotion. Product promotion presents an issue of recognising which products to promote and good for environment. Discrete wavelet transformation uses bands to divide the dataset into sections. Each section presents different characteristics that were compared against threshold values for identifying green products. The

methodology used for product promotion in DWT is given as under

DWT(Green Product Promotion)

- Input dataset

  Data=extract(dataset)

- Applying Pre-processing for noise removal

  Data=Pre-processing(Data)

- LL_Band=LL_DWT(Data)

  LR_Band=LR_DWT(Data)

  RR_Band=RR_DWT(Data)

  RL_Band=RL_DWT(Data)

- Compare Bands against LL_band, LR_band, RR_Band and RL_band
- Perform Prediction

The result of the mechanism is in the form of classification accuracy. The classification accuracy comes out to be 92%.

C. *Singular valued Decomposition*

This mechanism calculates the vectors in the form of features. This means that each attribute is sorted and placed within the feature vector. Order of variance is retained in this case. [10] discussed singular valued decompsotion mechanism for feature extraction with health care enviornment but same mechanism can be demonstrated in the Green product detection as well. The mechanism that is dicussed divides the entire dataset into clusters based on local extreme values.[11] By forming clusters, it will be easy to identify the product categories. The entire process is described as under

SVD(Green_Products)

- Calculate the local extreme from attributes of the dataset
- Connect all the local maxima and local minima for forming the clusters
- Calculate mean of formed clusters megnitude values
- Extract First component by performing the subtraction of raw values and mean magnitude value
- Repeat the above steps for each individual component extraction
- Perform prediction

This procedure is simple enough to extract effective features from the dataset for result prediction. Classification accuracy through his approach is 93%.

D. *Filtering*

All the mechanisms discussed above will be incorporated within the filtering mechanisms. Recommender system generally uses two types of filters: Content and collaborative filters.

- Content Filtering

[12]proposed recommender system for product promotion. Content based filtering mechanism was used in this case. Content based filtering mechanism for ecommerce considered user preferences for product. This means stress is paid towards user preference only.

- Collaborative filtering

[13]discussed collaborative filtering in the field of product promotion. This filtering mechanism not only considers the user preference but also consider the feature of the product for recommendation. The mechanism generally promote accurate product according to the user preference.

This section discussed multiple techniques for product promotion. Methodology and result is also specified and SVD along with collaborative filtering produced best possible result in terms product promotion.

III. METRICS OF GREEN PRODUCTS

[14]There are number products and number of companies which are considering safety of the planet and proceeding toward preserving the environment. So people more and more converging towards the utilization of Green Products. [7], [15]In the proposed system the products which we are considering are electronic products such as LED, Microwave, and Air Conditioner etc. In order to decide whether the product is Green or not number of parameters is to be considered.

A. *Parameters of Green Product*

There is nothing empirically proven about determining whether the product is Green or not. But still we present list of parameters which can be considered in the recommender system to decide whether the product is Green or not. When decided than only the product is promoted by the recommender system.

B. *Specific Label*

The products in which specific values are mentioned are considered more Greener than the products in which nothing specific mentioned. If product label includes created from 100% natural ingredients than products in which nothing is mentioned.

C. *Bogus Claims*

There are number of a company who claims to create and promote Green products. Look for the terms like organic or recycled. It is up to the users to identify which product are Green by looking for the above said headings.

D. *Ratings*

Electronic products generally have ratings associated with them. Air Conditioners rating generally termed through number of stars. The products having highest stars should be recommended.

E. *Eco Friendly*

The products which are eco friendly are mentioned over the product wrapper. The products which specify eco friendly must be selected for promotion.

F. *Energy Efficiency*

The products which consume less power are Green in nature. So only those products in which power is not wasted should be selected for Green Products Category.

There are number of other parameters which can also be considered in order to decide the products which must be promoted by the recommender system.

IV. Problem Defination

Each discussed mechanism including PCA, DWT and SVD may not operate properly in case noisy data is present. So first step in every methodology should be pre-processing. Pre-processing mechanism ensures better classification accuracy since all the dataset will be corrected using pre-processing mechanism. Pre-processing mechanism through proposed methodology could include mode based strategy. In addition, correlation based mechanism with highest variance could be used for feature vector that is missing in existing methodology. Hybrid feature extraction with collaborative filtering is also missing. This reduce the overall classification accuracy of the recommender system.

V. Proposed Methodology

The proposed mechanism is hybrid approach of collaborative filtering and correlation based singular valued decomposition approach. The mechanism ensures better pre-processing mechanism by eliminating noise if any from the dataset. After eliminating the noise, necessary component from the dataset is fetched to obtain feature vector. Feature vector formation is then followed by collaborative filtering to ensure better product promotion according to user preference. The methodology of the proposed mechanism is given as under

Proposed Hybrid Methodology

- Receive the parameters of the products to be tested(P_i)
- Compare P_i with the membership function(u_i)
- If P_i €u_i then

  Membership validated

  Else

  Go to step 5.1

  End of if
- Check the rules of fuzzy to determine Green Products(V_i)
- If Valid(V_i) then

  Enter the product in Recommender system for promotion.

  Else

  Reject the product and move to next product.

  End of if
- Stop

VI. Conclusion and Future Scope

The sale of the product is required to be increased to survive in this tough environment. In addition, people become more and more conscious towards the environmental aspect as well. Identifying the parameters that identify the product is green or not is critical. Cost is the only parameter that is against the green product promotion mechanism. Cost of Green products is generally high. In addition SVD produced best possible result in terms of classification accuracy. This means this techniques in collaboration with collaborative filter can be used for product promotion.

In future, collaborative filtering mechanism can be used along with SVD and noise handling mechanism for better classification accuracy in product promotion approach.

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