ML ASSIGNMENT 5

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***Abstract*—*This paper presents a machine learning-based method for enhancing coupon recommendations in e-commerce. The system uses collaborative and content-based filtering and also hybrid models to forecast the user’s preference of coupons based on various behavioral factors and various product variables. This is complemented by other parameters related to context, including demographics and past browsing behaviour which narrow down recommendations even more. Findings from an experiment provide evidence that proves the efficacy ML-driven strategies used for transforming e-commerce personalization and boosting sales. There is a notable improvement in coupons’ relevance, as well as enhanced customer engagement.***

Introduction:

The underlying issue is the cold-start item recommendation problem. Cold-start scenarios refer to a situation where there is no previous event such as rating or click for some user and item. In such situations, further information is necessary on user characteristics, including user attributes such as gender, age, geographic location, and occupation, and item-specific characteristics, such as genres, product areas, and keywords for prediction purposes.Predict what coupons a customer would buy during a certain duration based on previous purchases and browsed. This is an entire-year of transactions data for twenty eight thousand seven hundred thirty-four individuals ranging from July 2011 to June 2012. The prediction shall be done for next week’s 310 new coupons, having their own properties listed too. The challenge is to predict: Which number of this 310 coupons will each of the 22,873 people acquire.Create a model for collaborative filtering, either user-based or item-based; compute the dot product of the user profile and the item profile and calculate the cosine distance between them.

Methodology:

Discussion about the methods and procedures of experimentation is done in this section. Speak about the specific tasks like implementing perceptron and neural network, and about the specific experiments . Describe the datasets, initial parameters, and any tweaks applied in experimentation.

Results:

The findings should be presented in the results section in a logical and concise order. Show the results using Table, graph or any other form of chart. You can organize this section by subheadings corresponding to each experiment (A1, A2, A3, etc.) and include the following information:

Experiment Setup: Setup is the first stage, where one should detail the parameters such as initial weights, learning rates, activation functions, among others.

Convergence Behavior: Explain how many epoches must pass in each experiment until it converges. Show it in Table/Graphs indicating the convergence behaviour.

Comparison of Activation Functions (A2): Comparison of Convergence Behavior of Different Activation Functions (Step, Bi-Polar Step, Sigmoid, ReLU). Compare the performance of two or more activation functions on the basis of the speed of their convergence and accuracy.

Learning Rate Variations (A3): Show plot or table on how many iterations lead to convergence when using different learning rates. Effects of Varying Learning Rates in Convergence.

XOR Gate Logic (A4): Problems in Implementing Perceptrons for XOR Gate Logic. OR gate circuit versus AND gate experiment chart.

Customer Data Classification (A5): Summarize the Results of Classifying Customer Transactions into High and Low Value through Sigmoid Activation Function Perceptron. Discussion and accuracy metrics are considered herein.

Comparison with Matrix Pseudo-Inverse (A6): Present Comparison Result Perceptron Approach Vs Matrix Pseudo-Inverse Method for Classification Tasks. Discuss both benefits and demerits of each strategy.

Neural Network Experiments (A7, A8, A9, A10): If any experiments were conducted using neural networks, please provide their results. Comparing neural networks with perceptrons on different tasks.

Discussion:

Discussion will involve interpretation of the findings and explaining their significances. Address the following points:

Convergence Behavior: Disaggregate results of various experiments on convergence. Describe any existing patterns or trends in the required number of iterations for convergence.

Activation Functions: Why choosing different activation functions is important and its influence on the learning process. Select Appropriate Activation Functions for Specific Tasks.

Learning Rate: Effects of Differential Learning Rates on Convergence and Learning Speed. Show that the choice of a suitable learning rate is critical.

Comparison of Approaches: Comparison of the perceptron approach versus neural networks and matrix pseudo-inverse methods. Which methods suit certain situations best as well as their respective benefits and drawbacks.

Practical Applications: Link your findings to actual life situations. Examine the application of the knowledge gained from these experiments.

Conclusion:

## Literature Survey

* [The effect of permanent product discounts and order coupons on purchase incidence, purchase quantity, and spending](https://www.semanticscholar.org/paper/ab4917e8369f86329ef373f1c53ae59b21f06d1f)

Huan Liu+ 2 authorsHong Zhao

2020, Journal of Retailing

Effects of Permanent Product Discounts and Order Coupons on Consumer Behavior. Journal of Retailing. Thus, this paper examines the role that such promotions have on buyers’ intention to make new purchases and the quantities in which customers choose to buy. The paper is enlightened by the analysis of the core parameters that reveal the impact of these promotional approaches to consumption behavior change among consumers providing relevant information to the retailers whose aim is to perfect their marketing plans.

* Which Categories and Brands to Promote with Targeted Coupons to Reward and to Develop Customers in Supermarkets

The following essay discusses practical approaches to encouraging customers’ loyalty via the use of coupons in supermarkets. Retailers may maximize their marketing investments by determining the leading product-categories and brands. Findings offer practical solutions for supermarket managers striving to retain customers and boost sales using strategic coupons.

* [The Three Faces of Consumer Promotions](https://www.semanticscholar.org/paper/f0f85ef4a474247a5dfe42331aec42a2a4a65ebb)

Priya Raghubir, J. Inman, Hans Grande

2004, California Management Review

The research delves into three distinct approaches to promotions: price discounts, premiums, and contests/sweepstakes. The exploration of these techniques provides useful perspectives to marketers trying to reach and alter consumer conducts through different marketing efforts.

RFERENCES

[The effect of permanent product discounts and order coupons on purchase incidence, purchase quantity, and spending](https://www.semanticscholar.org/paper/ab4917e8369f86329ef373f1c53ae59b21f06d1f)

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