FUZZY PERSONALIZED SCORING MODEL FOR RECOMMENDATION SYSTEM

Chao-Lung Yang[1], Shang-Che Hsu[1], Kai-Lung Hua[2], Wen-Huang Cheng[3]*
[1]Department of Industrial Management National Taiwan University of Science and Technology
[2]Department of Computer Science and Information Engineering National Taiwan University of Science and Technology
[3]Department of Electronics Engineering National Chiao Tung University

INTRODUCTION

Recommendation system, can be considered as software which provides the suggestion to link the user's preference on context thought information filtering and decision support system based on the collected data.

- **Collaborative Filtering**
  - ✓ *Most used in recommendation systems.*
- **Demographic vs Purchasing Behaviors**
  - ✓ *Correlated demographic with purchasing behaviors*
- **Framework to Feature Importance**
  - ✓ *Identifying the Demographic features Importance to Purchasing Behavior*
  - ✓ *The Measurement of Multi-Features Importance.*
- **Fuzzy Measurement to Scoring/Rating**
  - ✓ *Weight the multi feature importance*
  - ✓ *Previous research uses exist user's subjective preference*
- **Objective of this research**

Aiming to attack the data preprocessing issue of converting the demographic data and purchasing records needed.

PRELIMINARY RESULT

- ✓ *Data: dataset from Kaggle Santander competition which includes customers demographic and their history of purchase record is used.*
- ✓ *Scoring result: group "Payroll Oriented" of customers is more interested in the fundamental product or service from financial institute Fig2.*
- ✓ *Product 5 is Payroll Account, Product 9 is Particular Plus Account, Product 22 is Payroll*

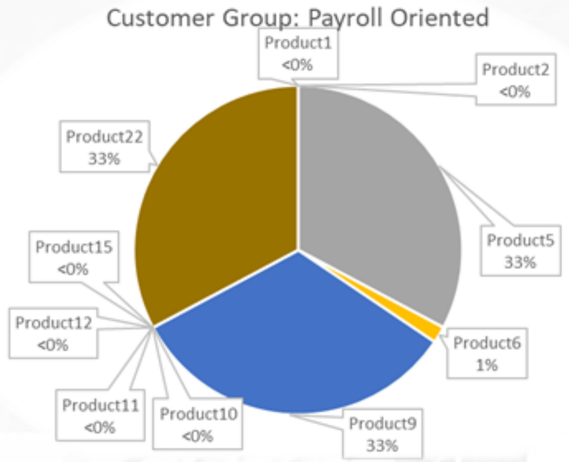

Fig. 2: The process of the proposed fuzzy personalized scoring model.

METHODOLOGY

- **Framework Input data:**
  - ✓ *The two data sets : user demographic data and product purchase data*
  - ✓ *data framework of generating score of user against product is proposed based on the importance of demographic features and product purchase records Fig1.*
- **Customers Clustering**
  - ✓ *Input data: user demographic data*
  - ✓ *Data attributes type: mixed of numeric and categorical data.*
  - ✓ *K-prototype Method*
  - ✓ *Output result: user demographic data with grouping*
- **Feature Importance Finding on Purchase Records**
  - ✓ *Input data: user demographic data with grouping + product purchase data*
  - ✓ *Random Forest Method*
  - ✓ *Output result: The importance of one product to one group*
- **Fuzzy Integral Scoring**
  - ✓ *Input data: user demographic data + all features importance for one product.*
  - ✓ *λ –measurement on multi-features importance.*
  - ✓ *Fuzzy Integral Method*
  - ✓ *Output result: Score of one product to one data group*
- **Score Personalization**
  - ✓ *Input data: user demographic data + score of all product*
  - ✓ *direct product*
  - ✓ *Output result: Score of one product to one customer*

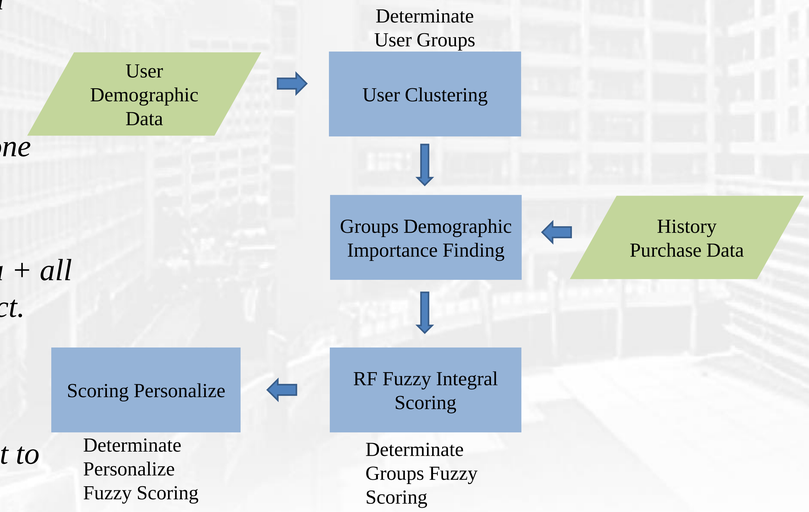

Fig. 1: The process of the proposed fuzzy personalized scoring model.

CONCLUSION

- ✓ *Data preprocessing framework generates preference score by demographic data.*
- ✓ *The results of Kaggle data application shows the framework is able to identify customer segmentation each customer group's purchasing preference.*
- ✓ *In the future work,*
  - ☐ *Extend the scoring system by considering the timing factor.*
  - ☐ *Implement tensor factorization to deal with matrix operation.*