

## Tensorized neural network for multi-aspect rating-based recommendation

### ABSTRACT

Generating personalized recommendations is one of the most crucial aspects in Recommender System research area. Most of the researches only focus on the accuracy of recommendation using collaborative filtering that relies on a single overall rating that represents the overall preferences. However, the user may have a different emphasis on different specific aspects that affect the users' final rating decisions. Therefore, we present a neural network model that utilize multi-aspects ratings using Tensor Factorization to improve the accuracy of personalization, as well as optimizing the dynamic weights of the aspect. To measure the estimated weights for the aspects, we employ the Higher Order Singular Value Decomposition (HOSVD) technique called CANDECOMP/PARAFAC (CP) decomposition that allows for multi-faceted data processing. We then develop the Neural Network with back propagation error to train the model with different parameter settings and limited computational time. We also use a non-linear activation function in each hidden layer in various settings. The experimental result measured using MAE shows that the proposed model has significantly out performed the baseline approach in terms of the prediction accuracy. Based on the observation, the performance of rating prediction has been improved by employing the Tensorized Neural Network model and can overcome the problem of local optimum convergence for multi-aspect rating recommendation.

**Keyword** : Collaborative filtering; Multi-aspect; Recommendation system; Tensor factorization