

# Trust in Recommender Systems: A Survey

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Chetan Kulkarni

San Jose State University

Deep Learning



# Introduction

- With the increase in popularity on AI, Various services in the world are going to be heavily dependent on AI, especially Recommendation systems.
- Already recommendation systems have their way in many places such as Netflix Recommended Movies, Amazon Recommended Products, Google recommended news, Facebook recommended friends systems, Instagram recommended influencer Or the most popular YouTube recommended videos.



# Aspects of Trust

- 1. Social Awareness:** *How the recommendation system is leveraging the social behavior of a person and his peers.*
- 2. Robustness:** *How is the recommendation system able to leave out the noise created by data*
- 3. Explainability:** *if the end-user understands the factors that led to a particular recommendation*



# Social Aware Recommender Systems

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- collaborative filtering, a simple and elegant way of recommendation. How other people in your friend circle has rated the product.
- Auto Encoder based methods, Neural network model helps to learn latent factors of users and user choices, which are not easily observable
- RNN based models deal with sequential and time-series data. Generally, capture the user's current preference .based on Users' online presence and activities online. Facebook uses this method
- GNN based Models, Mines Social Graph structure. This is a fairly complex procedure. In this Method Users History, Users Neighbours History and their Neighbours history and so on is aggregated. And likes and dislikes are stored. And on that data recommendation is produced. This GNN is always improving. Google, Facebook uses this technique.
- Hybrid Methods, All the above methods are used parallely and a common recommendation system is also created.



# Robustness of Recommender Systems

- *merchants may hire a group of spammers to insert their profiles and fake ratings into the systems, which will affect the performance of the recommendation and also the customer's trust in recommender systems*
  1. Shilling Attack Detection Algorithms
  2. Deep Learning-based Shilling Attack Detection Algorithms

# Explainable Recommender System

- Explaining Collaborative filtering;

**Your neighbors' rating for this movie**



Rating	Number of Neighbors
★ ★ ★ ★ ★	2
★ ★ ★ ★	3
★ ★ ★	4
★ ★	0
★	0

# Explainable Recommender System

- Explaining Textual Data:

Yelp (user), L-Attn-only model: local attention

They carry some rare things that you can't find anywhere else. The staff is pretty damn cool too best in Arizona . I prefer ma-and-pa. They treat you the best and they value your business extreme . They are good people great atmosphere and music. I definitely believe that Lux has the best coffee I've ever had at this point. Screw all my previous reviews. This place has coffee down , they make damn good toast too .

Yelp (user), D-Attn model: local attention

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# Explainable Recommender System

- Explaining on Visual Data:

User	Purchase History			Result		
A						Sleeves Length: Short
						Trousers Length: Full
						Neckline: V
						Body Length: Micro



# Explainable Recommender System

- Visual Data + NLP :

	
wow ! this is so beautiful ! love the skirt ! (✓)	love the pink ! (✓)
	
love this set ! the colours are amazing . (✓)	so beautiful and such a nice style here like it . (✓)
	
great look great set great mixing outfits n ' nice bag . (✗)	thank you so much for your lovely comments ! (✗)

# Conclusion

- We discussed various techniques with which we can establish TRUST in the Recommendation system. With Days to come with advancement of Artificial Intelligence and machine learning.
- The **TRUSTability** of these systems is going to be a key factor. And This paper is a step towards that future