

# CS-4053 Recommender System

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**Lecture 12:** Generative Recommendations (in practice)

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# Basic Design Principles

- ❑ We never work on **ratings** *i.e.*, these ratings are to be transformed to **interactions**
- ❑ We always use a supervised variant of GAN for recommender system *e.g.*, cGAN, cWGAN, IRGAN
- ❑ We can do either user-to-item generation or item-to-user generation
- ❑ Always watch out for a trivial solution (*network learning to output all zeros or ones*)

# Example: MIND News Recommendation

- ❑ A news dataset with impression logs and historical choices for users and news items
- ❑ Each impression comes with a positive response (*1*) or negative response (*0*)

	ImpressionID	UserID	Time	History	Impressions
0	1	U13740	11/11/2019 9:05:58 AM	N55189 N42782 N34694 N45794 N18445 N63302 N104...	N55689-1 N35729-0
1	2	U91836	11/12/2019 6:11:30 PM	N31739 N6072 N63045 N23979 N35656 N43353 N8129...	N20678-0 N39317-0 N58114-0 N20495-0 N42977-0 N...
2	3	U73700	11/14/2019 7:01:48 AM	N10732 N25792 N7563 N21087 N41087 N5445 N60384...	N50014-0 N23877-0 N35389-0 N49712-0 N16844-0 N...
3	4	U34670	11/11/2019 5:28:05 AM	N45729 N2203 N871 N53880 N41375 N43142 N33013 ...	N35729-0 N33632-0 N49685-1 N27581-0
4	5	U8125	11/12/2019 4:11:21 PM	N10078 N56514 N14904 N33740	N39985-0 N36050-0 N16096-0 N8400-1 N22407-0 N6...

# Example: Constructing Training Data

- We can create training data by treating historical choices as positive interaction and “*ignored*” news in the impression as negative interaction

	UserID	NewsID	Interaction
78833	U46778	N17157	1
78833	U46778	N28081	1
78833	U46778	N58641	1
78833	U46778	N3926	1
78833	U46778	N16290	1

	UserID	NewsID	Interaction
78833	U46778	N60456	-1
78833	U46778	N19592	-1
78833	U46778	N35738	1
78833	U46778	N3123	-1
78833	U46778	N12029	-1

# Example: Constructing Training Data

- We can then treat each unique rows as a user and each unique column as a news item and intersection value as interaction

```
[[1. 0. 0. ... 0. 0. 0.]  
 [1. 0. 0. ... 0. 0. 0.]  
 [1. 0. 0. ... 0. 0. 0.]  
 ...  
 [0. 0. 0. ... 0. 0. 0.]  
 [0. 0. 0. ... 0. 0. 0.]  
 [0. 0. 0. ... 0. 0. 0.]]
```

Training Data Shape: (26040, 6838)

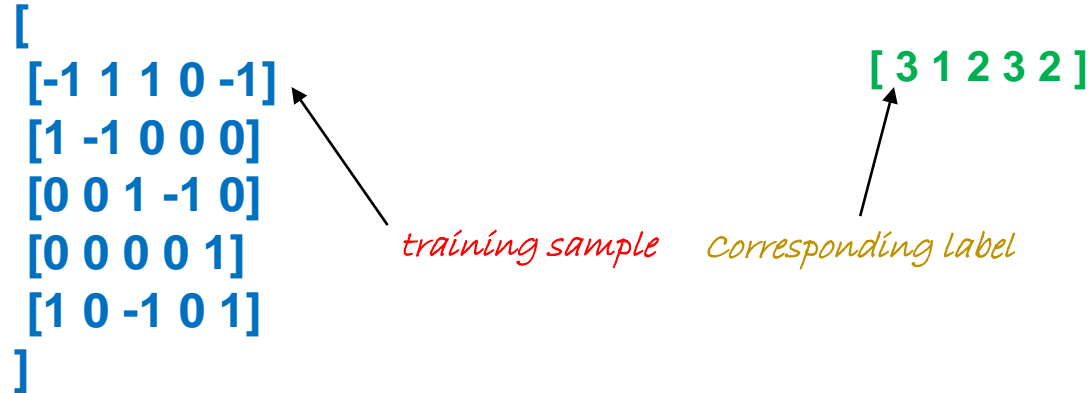
# Example: But... where are the labels?

- We often do not have any labelled recommendation data hence we can use clustering or some other annotation technique to create our label set

	NewsID	Category	Subcategory	Title	Abstract	Processed_Text	Embeddings	Label
2	N61837	news	newsworld	The Cost of Trump's Aid Freeze in the Trenches...	Lt. Ivan Molchanets peeked over a parapet of s...	news newsworld cost trump aid freeze trench uk...	[-0.05749018, -0.05521024, -0.016900085, 0.030...	5
3	N53526	health	voices	I Was An NBA Wife. Here's How It Affected My M...	I felt like I was a fraud, and being an NBA wi...	health voice nba wife here affected mental hea...	[-0.03127052, -0.029868228, -0.028364867, 0.05...	2
4	N38324	health	medical	How to Get Rid of Skin Tags, According to a De...	They seem harmless, but there's a very good re...	health medical get rid skin tag according derm...	[-0.07352022, -0.0478042, -0.007855178, 0.0447...	1
5	N2073	sports	football_nfl	Should NFL be able to fine players for critici...	Several fines came down against NFL players fo...	sport footballnfl nfl able fine player critici...	[0.018641314, -0.004955198, -0.01916305, 0.091...	3
10	N9721	health	nutrition	50 Foods You Should Never Eat, According to He...	This is so depressing.	health nutrition food never eat according heal...	[-0.05535877, -0.080809906, -0.044505723, 0.01...	9

# Example: GAN Training

- We can train our generative network in the following manner:



# Example: Generating Recommendation

