AI - Impact through social media

How ideas, mental health and friendships can be influenced

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Can social media make you depressed

A multi-agent simulation that models social media impressions and connections might help

Your choice of social media, or rather the Social media developer's choice of a reccomender system, might be affecting your mental health.

Recommender Systems

Recommender systems are algorithms used to suggest new profiles for you to befriend/follow/connect with on social media.
They work on the basic principle of:
We like to hang out with people similar to us

Mental Health

But when applied to mental health, we attract and get attracted to the people with mental health similar to us? If this were true, that would mean we might have a hard time improving our mental health. As the people we hang out with leave an impression on us. After all,

You are the average of the 5 people you hang out with.

Study Goals

This study aims to find if this is true or not. We are going to study the impact of AI driven social media on our mental health.

We will do this by modelling it as a multi-agent graph simulation.

Hypothesis

Hanging out with depressed people makes you depressed. And hanging out with happy people makes you happy.

Hence, recommender systems that are inherently learning about your mental health and suggesting similar friends and content to you might put you in an unbreakable cycle if your mental health is bad.

Problem Formulation

we represent people with graph nodes.

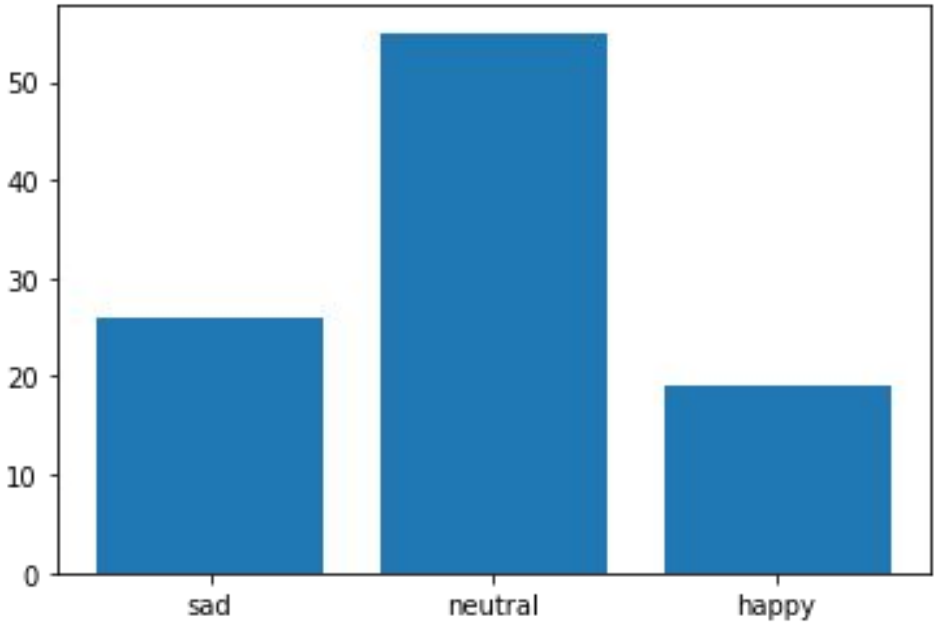
We use the Networkx library for modelling our graph:
https://networkx.org/

Each person has a happiness score **h** which suggest how happy they are currently on a linear scale of 0 to 1.
Each node is labelled as one of: {happy, neutral, sad} depending on their score.

We create 100 nodes(people) where each of their happiness index is drawn from the normal distribution:
$N(0.5, 0.1)$

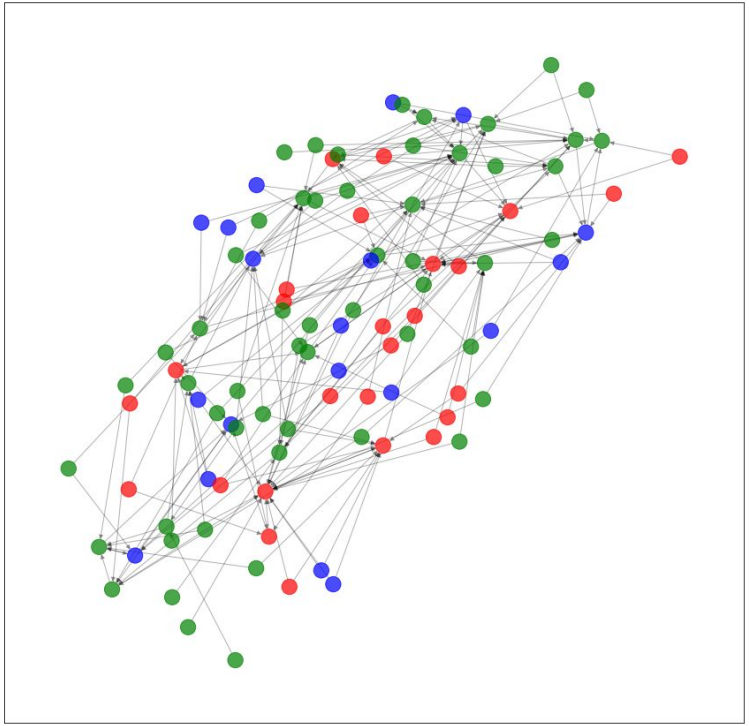
and they are assigned a happy/neutral/sad label based on:
$0 < h < 1/3$ -> sad
$1/3 < h\ 2/3$ -> neutral
$2/3 < h < 1$ -> Happy

Distribution of happiness scores(100 people)



Initial connections

We initially start with each person having 2 friends, randomly chosen from the group



New friends and Impressions

In each iteration, each node makes a new connection.
Since it is more likely to get recommended similar people, the probability of making a friend from a certain class is as follows

let P(X|Y) be the probability of you befriending a node from class X given you are from class Y

sad - S, neutral - N, happy - H

Assume that S is x% more likely to befriend S than N. and x% more likely to befriend N than H. this follows from our similarity assumption
Let P(H|S) be the probability of sad befriending happy
then $P(N|S) = (1 + x/100)P(H|S)$

$P(S|S) = (1 + x/100)P(S|S)$
with the additional constraint: $P(S|S) + P(H|S) + P(N|S) = 1$

for the neutral case:

we have same probability for happy and sad and x% more for neutral

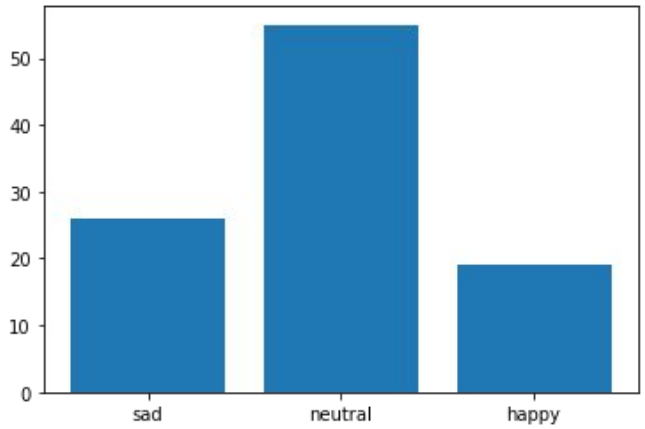
Impressions

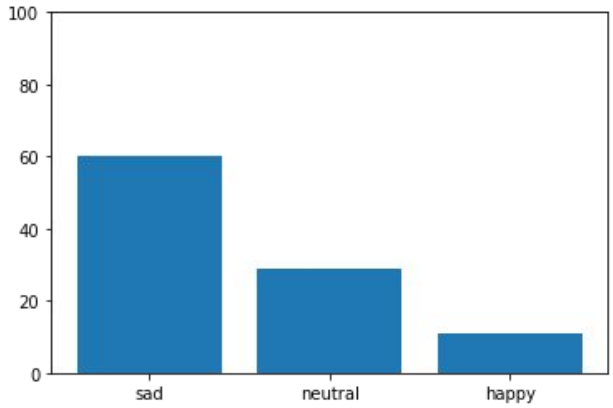
In each iteration, a node's current friends all leave an impression on it. let s be the impression strength.
then in each iteration for a node i, for all nodes connected to i
h = s_1 + s_2 + ... + s_k, where s_j is the impression from the jth connected node
impression strength from: happy = +s, neutral = 0, depressed = -s

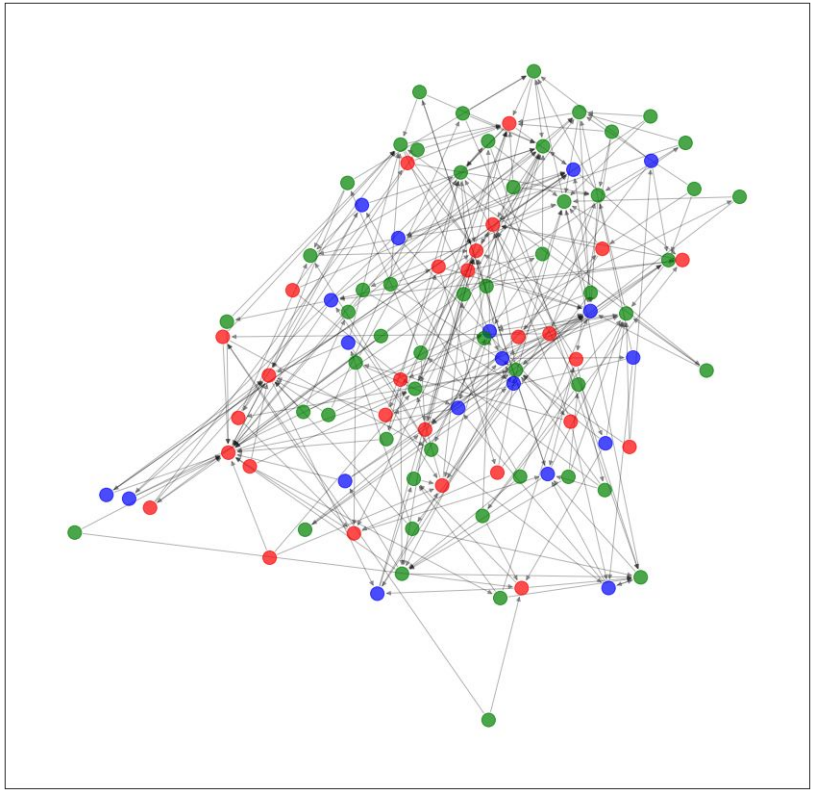
Simulation

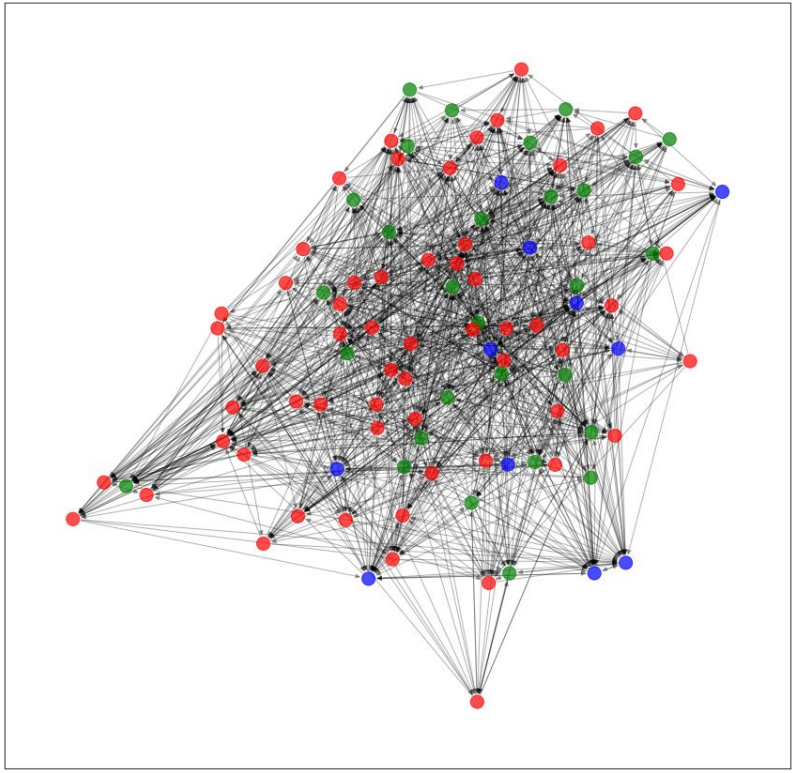
we now conduct a simulation for 10 runs with x=30% and s=0.02

Results


50
40
30
20
10
0
sad
neutral
happy


100
80
60
40
20
0
sad
neutral
happy





Conclusion

as you can see, the number of neutral and happy people decreased and the number of sad/depressed people increased.

While this is sensitive to initial conditions, on almost all runs, the neutral group gets smaller and the crowd tends to polarise, which might be harmful for our society!

Choose your AI wisely!

so even if you are neutral but on the sadder side, social media recommender systems could make you quite sad.

This result bring out the reality of modern social media and how it is fuelling greater levels of depression among the youth.