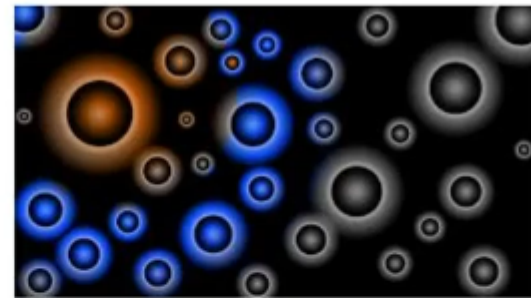


On 21st August, 2021 ~ Saturday_3

From Lecture 07 - Social Networks: The Challenge (4 min)

Let me ask you a **non-trivial** question about social-networks... an seemingly un-related question **What are the total no. of atoms in the universe..??**



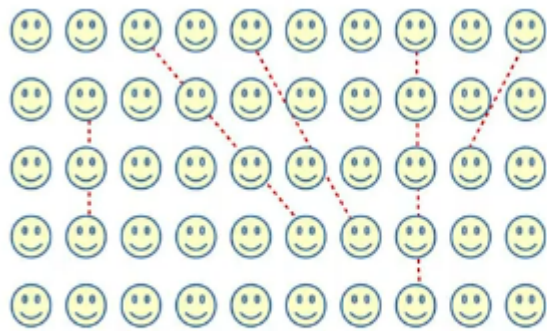
Number of Atoms in the Universe ?

$> 2^{200}$

$4 \times 10^{79} - 4 \times 10^{81}$

So what..??

Observe...!! What are the total no. of friendships between 50 people in a class..??

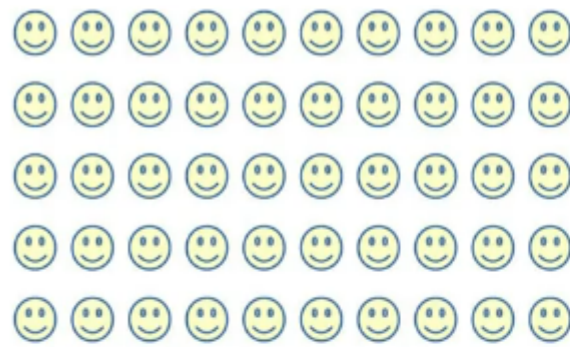


Total possible
number of
friendships

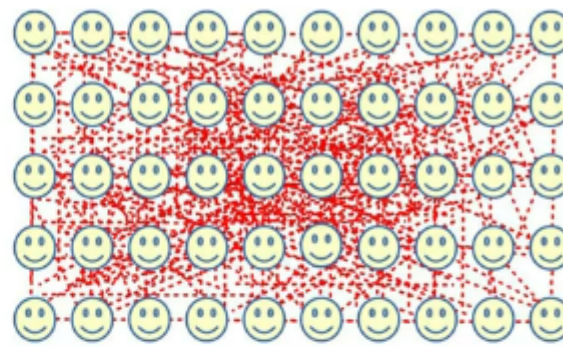
?

How do friendships happen here?

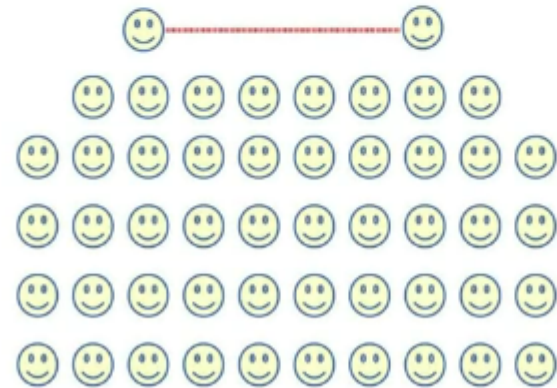
i.e.,



Nobody is friend with nobody.



Everybody's friend with everybody.



Only two are friends.



so, on... and so, forth..

How many total graphs on 50 nodes are possible..??

$$2^{\binom{50}{2}} = \text{infinity}$$

(according to Google calculator)

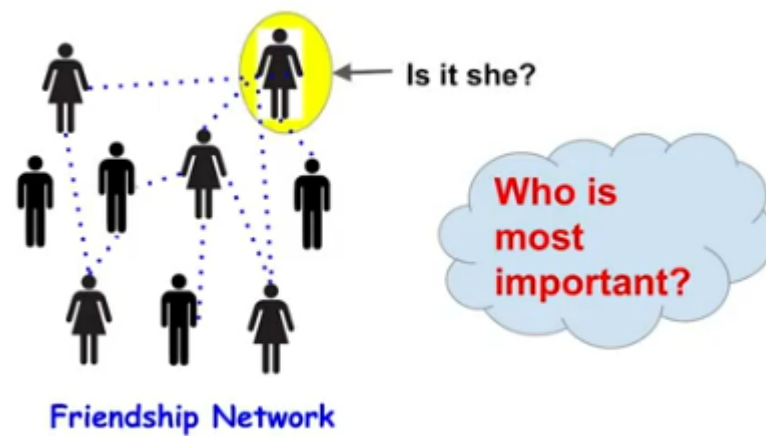
it tells that.

$$2^{\binom{50}{2}}$$

Much much much more than

1. Google Page Rank

Say, given a network of friends, who is the most important person in those..??

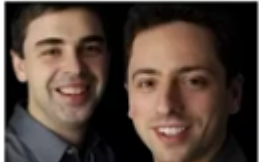


Is it the **no. of links that one has** or any thing..?

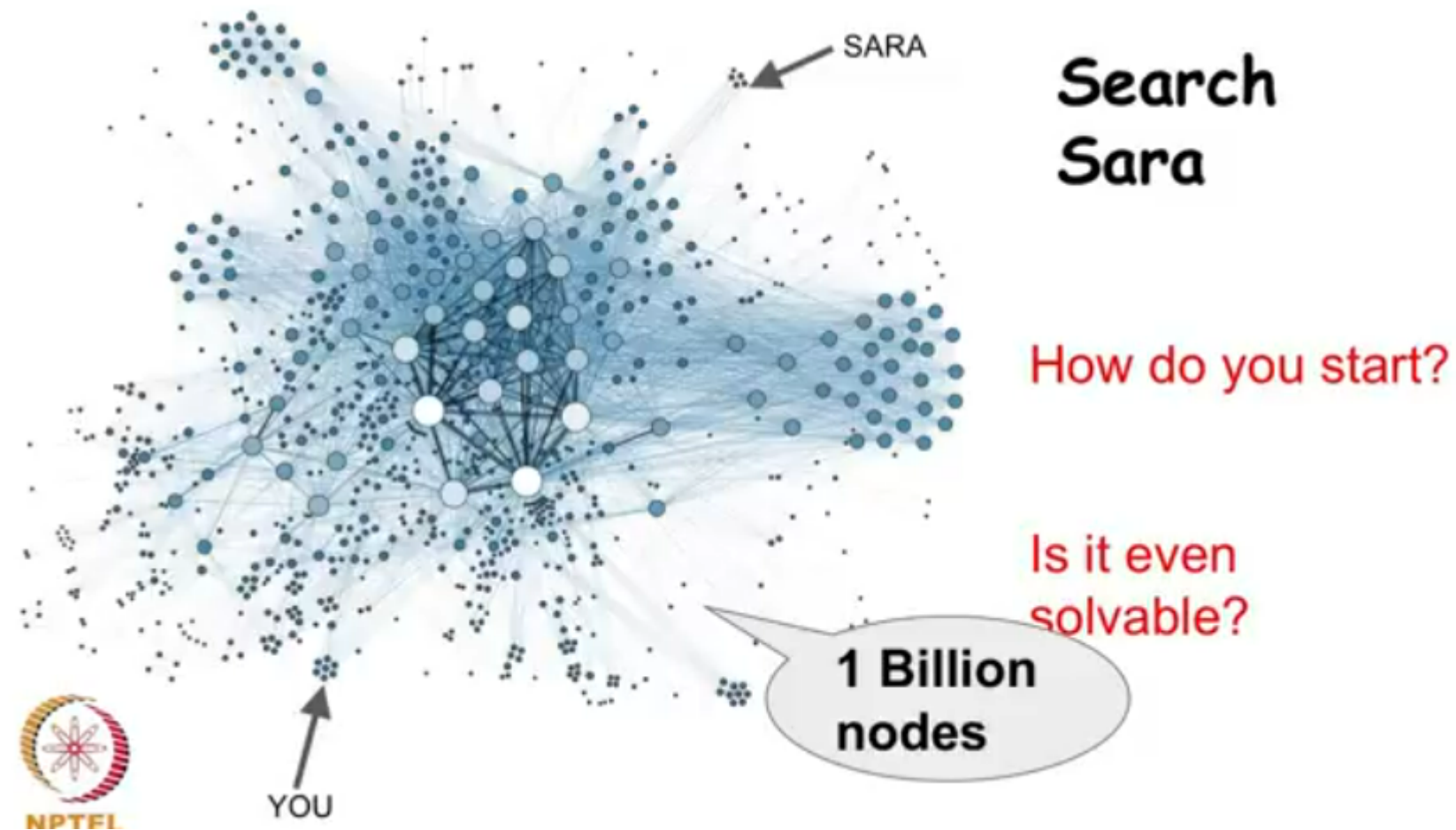
This is the question that yielded 450 Billion Industry..



It might seem very obvious, but it took a team of two people to bring this to the lime-light..



2. Searching in a Network



Given a 1 Billion nodes, how do you search for a node?

There can be no. of networks with even 15 nodes, then how do we go here..???



Such complicated questions, very interestingly, they have simple and straight forward answer..

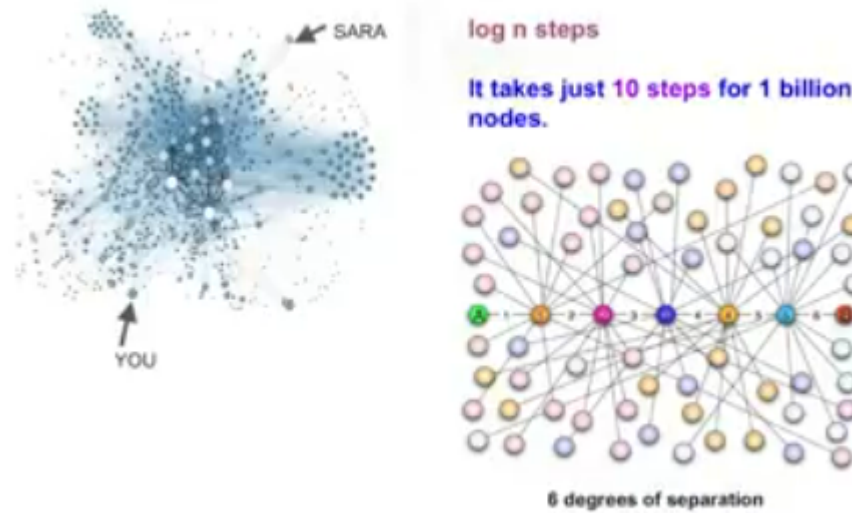
ot

be precise, its \log^2 ..

Brush up, what do you know about logarithm..

Logarithm of any number, is simply counting the no. of digits in it.. say for a big number.. it just takes be 10 or 20 +... .. transactions..

Why..?? How..??



We exploit a property in such networks.. called the **Small world Phenomenon**
a starkling part is that, it gives answer in a charm..

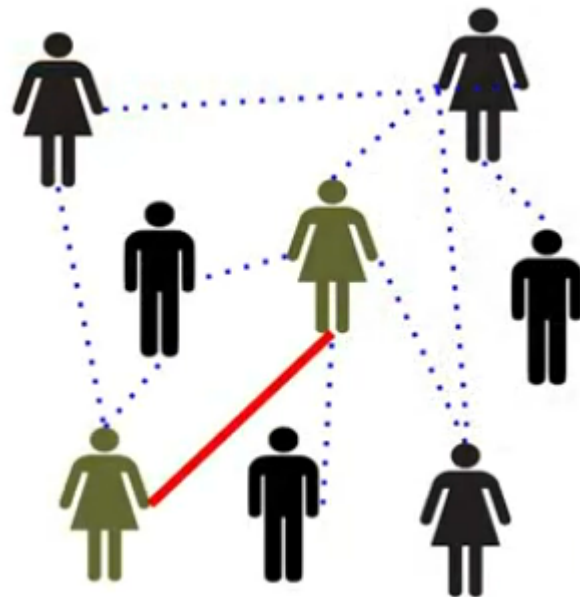
Its simple, but very beautiful and very elegant.. and

3. Link Prediction

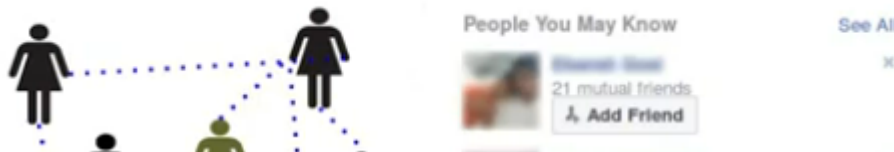


Predicting the future by seeing their hand is very debatable.. but prediciton in network is accurate..

i.e., Looking at ones friendship network, and telling, **who can be your next friend..**



Sounds like the familiar thing... **He could be your prospectus friend..** (friend's friend..) -- friendship suggestion in facebook..



4. Contagions

Next, we'll be seeing the *most-humanly questions..* i.e.,



Philosophical Humanly Questions

with elegant Computer science and Mathematics..

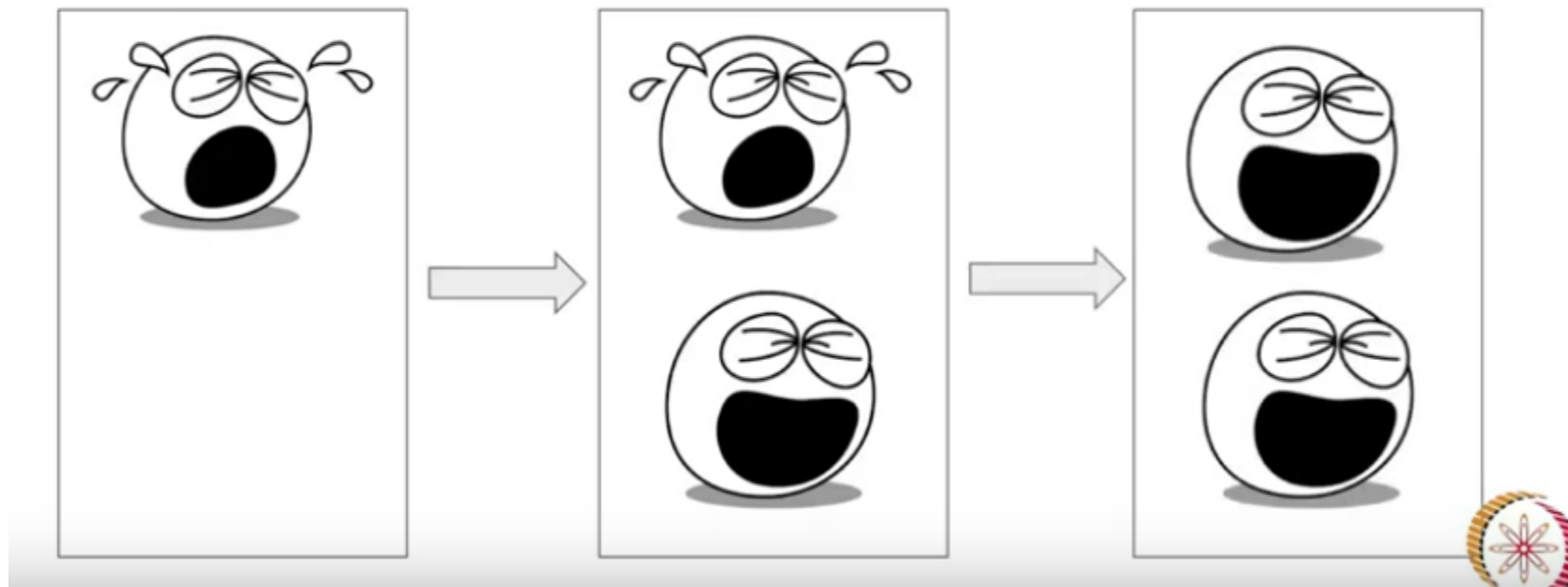
What are those..?

Is Obesity contagious?

- If you are friend of obes, you run into danger of becoming obes..

Is happiness contagious?

Is happiness contagious?



- If you are surrounded by happy people, you too become happy.

i.e., If your friend's friend is happy, you will be happy. --- Sounds like a cooked-up story.. NO, its a very well established scientific fact.

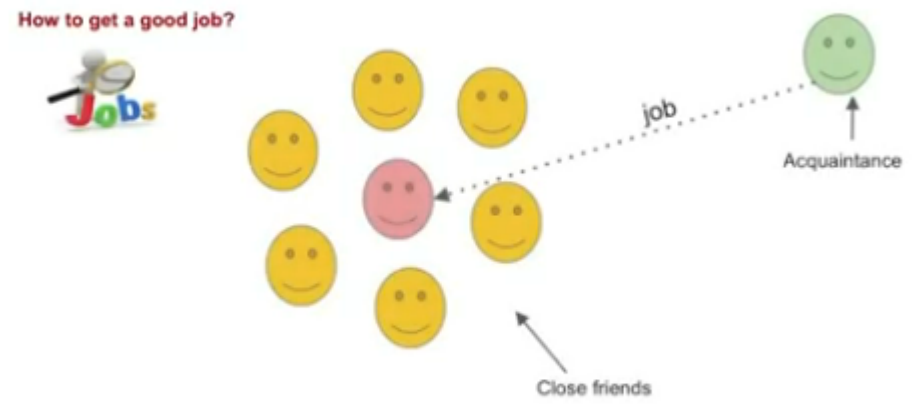
5. Importance of Acquaintances

Looking for a good job..

- How to get a good job..?
- What kind of friends should one make to get a good job?



This comes under the topic of **Strength of Weak ties**.



Strength of Weak Ties

Acquaintances: Friends who are not very close are called ..like not close friends, but ya...!! they are friends.

Those kind of people are important for getting dream job..

And even, your prospective's spouse is also a recommendation given by a far-away person.. An acquaintance who is not a close friend.