

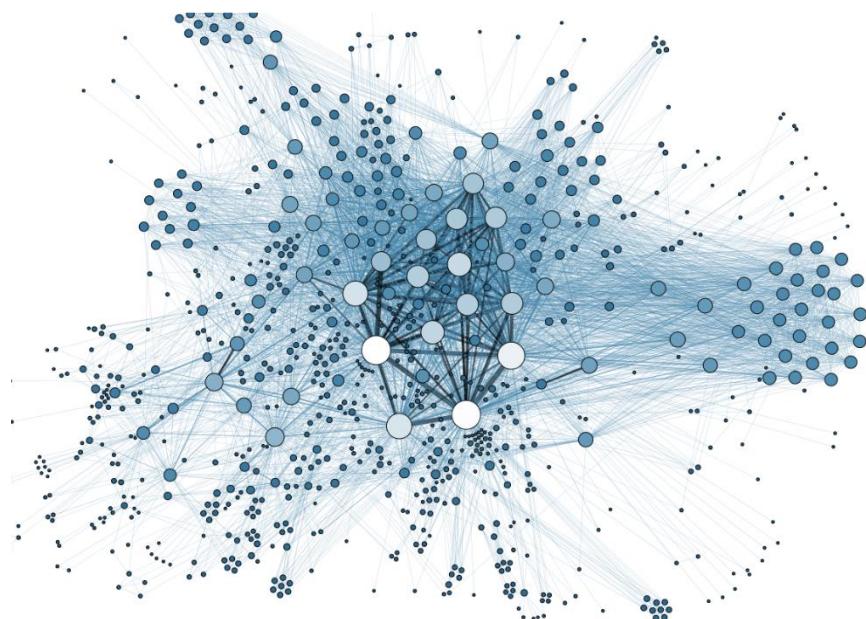
Introduction

A/Prof. Hongzhi Yin

School of ITEE

The University of Queensland

SOCIAL MEDIA ANALYTICS INFS7450



Various Social Media Platforms

SOCIAL MEowDIA EXPLAINED



Main Common Characteristics

- **Participation**
 - social media encourages contributions and feedback from everyone who is interested. It blurs the line between media (**producer**) and audience (**consumer**).
- **Openness**
 - anyone can register an account in most social media platforms and access the social media content.
- **Conversation**
 - whereas traditional media is about “broadcast” (content distributed to an audience) social media is better seen as a two-way conversation.
- **Community**
 - social media allows communities to form quickly and communicate effectively. Communities share common interests, such as a love of photography, a political issue or a favorite TV show.
- **Social Connections**
 - social media encourages users to build connections with other users.

Definition of Social Media

Social Media is the use of electronic and Internet tools for the purpose of **sharing and discussing** information with other human beings in more efficient ways.



- What kinds of data are you generating in social media? (Data)
- How can we analyze these data? (Techniques)
- What can we use these data/techniques for? (Applications)

Facebook

Mark Zuckerberg

Intro

- Founder and CEO at Facebook
- Works at Chan Zuckerberg Initiative
- Studied Computer Science and Psychology at Harvard University
- Lives in Palo Alto, California
- From Dobbs Ferry, New York
- Married to Priscilla Chan
- Followed by 116,781,916 people

Photos

[See All Photos](#)

Posts

Mark Zuckerberg February 12 at 12:47 PM ·

Happy Year of the Ox!

283K 46K Comments 4.9K Shares

Like Comment Share

Facebook

Mark Zuckerberg

Intro

- Briefcase icon Founder and CEO at Facebook
- Briefcase icon Works at Chan Zuckerberg Initiative
- Graduation cap icon Studied Computer Science and Psychology at Harvard University
- House icon Lives in Palo Alto, California
- Location pin icon From Dobbs Ferry, New York
- Heart icon Married to Priscilla Chan
- Wi-Fi icon Followed by 116,781,916 people

Photos

[See All Photos](#)

Posts

Filter icon Filters

Mark Zuckerberg verified

February 12 at 12:47 PM · Link

Happy Year of the Ox!

283K

46K Comments 4.9K Shares

Like icon Like

Comment icon Comment

Share icon Share

Social Media Analytics

Introduction

6

Facebook

Friends

Search

Friend Requests Find Friends ...

All Friends Birthdays Work College Current City Following

 Celine Zhang 30 mutual friends	...	 Ching Jing Lee 30 mutual friends	...
 Wang Linqing 29 mutual friends	...	 Joy Zhou 23 mutual friends	...
 Qun Huang 17 mutual friends	...	 Weiqing Wang 7 mutual friends	...
 Evan Mao 17 mutual friends	...	 Jing Jiang 21 mutual friends	...
 Xiao Jiang 12 mutual friends	...	 Huihui Cai 16 mutual friends	...

Facebook

Check-Ins

Places 145 Recent 297 Visited Cities 72



Olympic Forest Park
Visited on November 15, 2018



Peking University 
Visited on April 19, 2018



Tiraspol
Visited on October 8, 2017



Salzburg, Austria
Visited on September 2, 2017



4paradigm
Visited on July 29, 2017



Summer Palace, Beijing
Visited on July 1, 2017



Cheng Du, China
Visited on May 29, 2017



Beijing, China
Visited on April 5, 2017

Facebook

 **Events**

Past



JUL 16

Gigztest 31
Thursday, July 16, 2015 at 2:3...



APR 24

2015 Sony World Photograp...
Friday, April 24, 2015 at 10:00 ...



MAR 31

Do you want your picture on...
Tuesday, March 31, 2015 at 1...



NOV 15

Richmond Park visit
Saturday, November 15, 2014 ...



SEP 4

Solo Exhibition of Shu Yi's ...
Sunday, September 4, 2011 at...



DEC 1

Dana's fabulous birthday dri...
Tuesday, December 1, 2009 at...

Facebook

Likes

All Likes 80 Movies 2 TV Shows 5 Your Liked Artists 4 Restaurants 1 Apps and Games 2

 **Nishita Agarwal**
Personal Blog
[Like](#) [Follow](#)

 **Wrapidity**
Internet Company
[Like](#) [Follow](#)

 **Zootopia** 
Movie
[Like](#) [Follow](#)

 **British Airways** 
Airline Company
[Like](#) [Follow](#)

 **Escape Plan Ltd**
Escape Game Room
[Like](#) [Follow](#)

 **Blenheim Palace** 
Landmark & Historical Place
[Like](#) [Follow](#)

 **Facebook Hacker Cup** 
Website
[Like](#) [Follow](#)

 **DxDx**
Video Game
[Like](#) [Follow](#)

 **NXP Semiconductors**
Product/Service
[Like](#) [Follow](#)

 **Tiger brother and Me**
Pet
[Like](#) [Follow](#)

What about Twitter?

I Like To Make Stuff
@iliketomakestuff
Maker/Dad/Musician/Runner/etc/etc/etc I make free how-to content
Savannah, GA
iliketomakestuff.com
Joined January 2009

TWEETS 2,876 FOLLOWING 182 FOLLOWERS 2,701 FAVORITES 1,686 LISTS 1

Tweets Tweets & replies Photos & videos

I Like To Make Stuff @iliketomakestuff · 2h
If you see me at #makerfaire2015 ask me for a sticker!! #iltms #iliketomakestuff

What about YouTube?



PSY - GANGNAM STYLE (강남스타일) M/V



officialpsy

Subscribe

7,937,308

2,320,683,632

Download

Add to

Share

More

9,373,248

1,257,141

What about Yelp?

yelp Find tacos, cheap dinner, Max's Near CBD, Brisbane Queensland, Australia Log In Sign Up

Restaurants Home Services Auto Services More Write a Review For Businesses



Kristen M.
Carseldine, Australia
28 Friends 116 Reviews 1300 Photos
Elite 2018 '17 '16 '15 '14 '13 What is Yelp Elite?
"On the hunt for the best poachies in Brisbane"

Add friend Compliment Send message Follow Kristen M. Similar Reviews

Reviews

Sort by: Date All Locations All Categories Show First to Review



El Camino Cantina
Mexican
45 King Street
Bowen Hills Queensland 4006
Australia
4.5 stars 2/11/2019
1 check-in

What a great addition to the ever-growing King St! We popped in on Friday afternoon and nabbed a table outside away from the hustle and bustle inside. It was happy hour so our margaritas were half price and delicious :-) We ordered Nacho Macho to share, Grilled Chicken Quesadillas, and a Chipotle Chicken Burrito. I would definitely get the nachos and quesadillas again but the burrito was jam-packed with rice and a bit heavy for me. Looking forward to heading back again and again!



Social Media Analytics

Introduction

13

What about Yelp?

Reviews

Sort by: Date ▾

All Locations ▾

All Categories ▾

Show First to Review



El Camino Cantina

Mexican

45 King Street

Bowen Hills Queensland 4006

Australia

★★★☆☆ 2/11/2019

1 check-in

What a great addition to the ever-growing King St!

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Looking forward to heading back again and again!



Nacho Macho, Grilled Chicken Quesadilla



Nacho Macho, Strawberry Margarita & Grilled Chicken Quesadillas



Chipotle Chicken Burrito, Classic Margarita and Strawberry Margarita, Nacho Macho & Grilled Chicken Quesadilla

Was this review ... ?

Useful

Funny

Cool



What about Yelp?

Friends

Sort by: Recently Active ▾



Leah M.
Los Angeles, CA
879 reviews 1028 stars
Elite '19



Israel G.
Santa Maria, CA
3827 reviews 262 stars
Elite '19



Jonathon M.
Brisbane City, Australia
386 reviews 249 stars



Ben A.
Bald Hills, Australia
2 reviews 11 stars



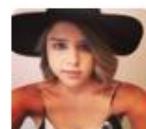
Anne S.
Fair Lawn, NJ
4948 reviews 127 stars



Don C.
Cordova, TN
3114 reviews 283 stars
Elite '19



Des B.
Las Vegas, NV
3849 reviews 97 stars



Emily B.
Old Adaminaby, Australia
2 reviews 3 stars



Kim M.
Honolulu, HI
2930 reviews 854 stars
Elite '19



Subir D.
Koreatown, Los Angeles, CA
4700 reviews 68 stars
Elite '19



Julia T.
Bridgeman Downs, Australia
60 reviews 159 stars



Greg N.
Upper Mt Gravatt, Australia
17 reviews 12 stars

Social Media Data

- **User Attribute Information (e.g, Demographic Information)**
 - Name, Age, Gender, Education Background, Work Experience, Home
- **User Generated Content (UGC)**
 - User Reviews/Comments in Amazon and Yelp, Tweets in Twitter, Timelines/Posts in Facebook, User Uploaded Photos in Instagram, User Uploaded Videos in YouTube, Short Videos in TikTok (Douyin in Chinese)
- **User-User Interaction Information**
 - Friends in Facebook, Following and Being Followed in Twitter, Private Communication in Wechat and WhatsApp
- **User-Item Interaction Information**
 - Likes in Facebook, Check-in in Facebook and Foursquare, Event Attendance in Facebook and Meetup, Watching/Downloading Videos in YouTube, Purchasing/Adding to Cart/Adding to Favorite in Amazon

Social Media Analyzing is the process of *representing*, *mining*, and *extracting* meaningful patterns from social media data

Ways to Analyze Social Media

- Social Media is a complex system consisting of
 - individuals (also called users)
 - information (e.g., reviews, posts, movies, music, events, products, and POIs)
 - and their interactions
- Networks are a general language for describing and modelling such complex systems

We will never be able to model and predict the social media system unless we understand the networks behind it!

Ways to Analyse Networks

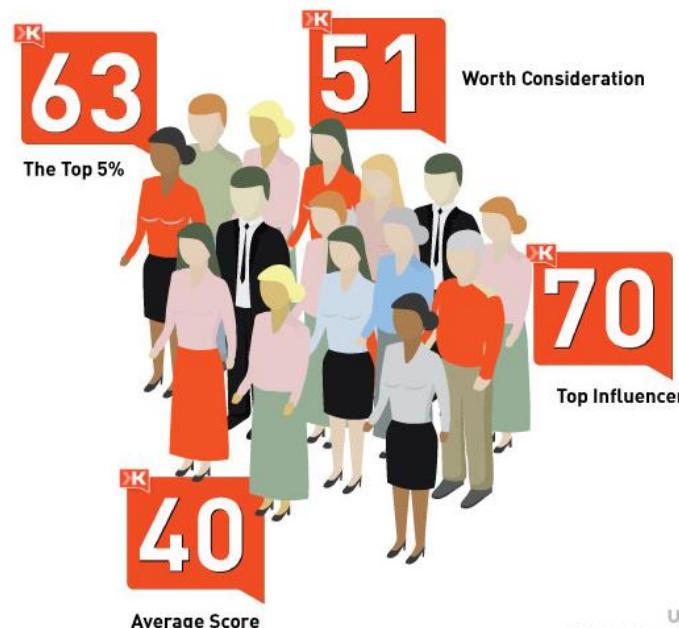
- **Measure nodes and networks**
 - Measure node centrality and network properties
- **Predict the behaviour of a given node**
 - User behaviour analysis and prediction
- **Infer the type of a given node**
 - Node Classification
- **Predict whether two nodes are linked**
 - Link prediction
- **Identify densely linked clusters of nodes**
 - Community detection
- **Understand and model information diffusion**

**Where do you think we can use
these social media data and
analysing techniques?**

Application: Identify influential users

1	 82	jeffbullas.com ✓ Following	2	 75	Jose Javier Garde L.. ✓ Following	3	 83	Susan Gilbert Follow
4	 81	Jay Baer ✓ Following	5	 72	Shelly Kramer Follow	6	 80	Lee Odden Follow
7	 74	Pam Moore ✓ Following	8	 80	Search Engine Land Follow	9	 82	Avinash Kaushik Follow

Influence score guides choosing brand and product ambassadors .



wst
©2014 Web Success Team

Application: Identify influential users



Barack Obama
ADD +

This account is run by #Obama2012 campaign staff. Tweets from the President are signed -bo.

Influences 2M others

17 tweet • 1 share • see more...



Justin Bieber
ADD +

Invite to Klout, and increase your verified connections!

#BELIEVE is on ITUNES and in STORES WORLDWIDE! - SO MUCH LOVE FOR THE FANS...you are always there for me and I will always be there for you. MUCH LOVE. thanks

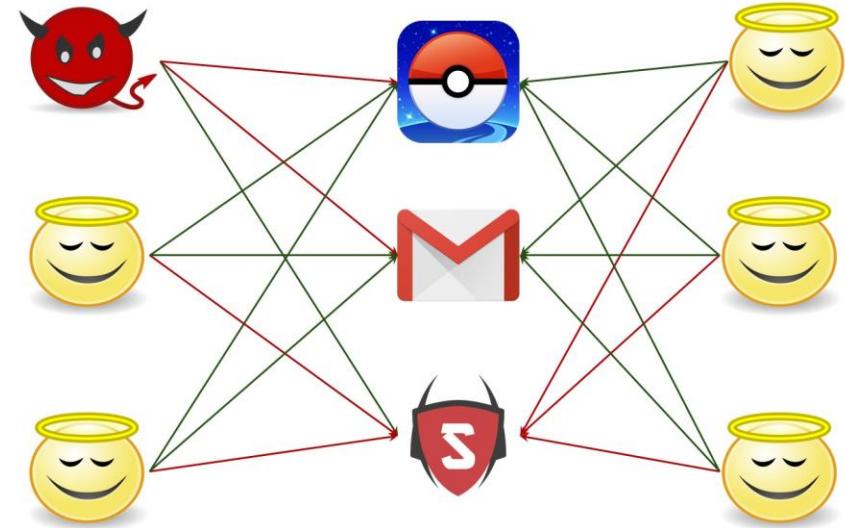
Influences 10M others

17 tweet • 1 share • see more...

Measuring User Node Centrality

Application: Fake Reviewer Detection

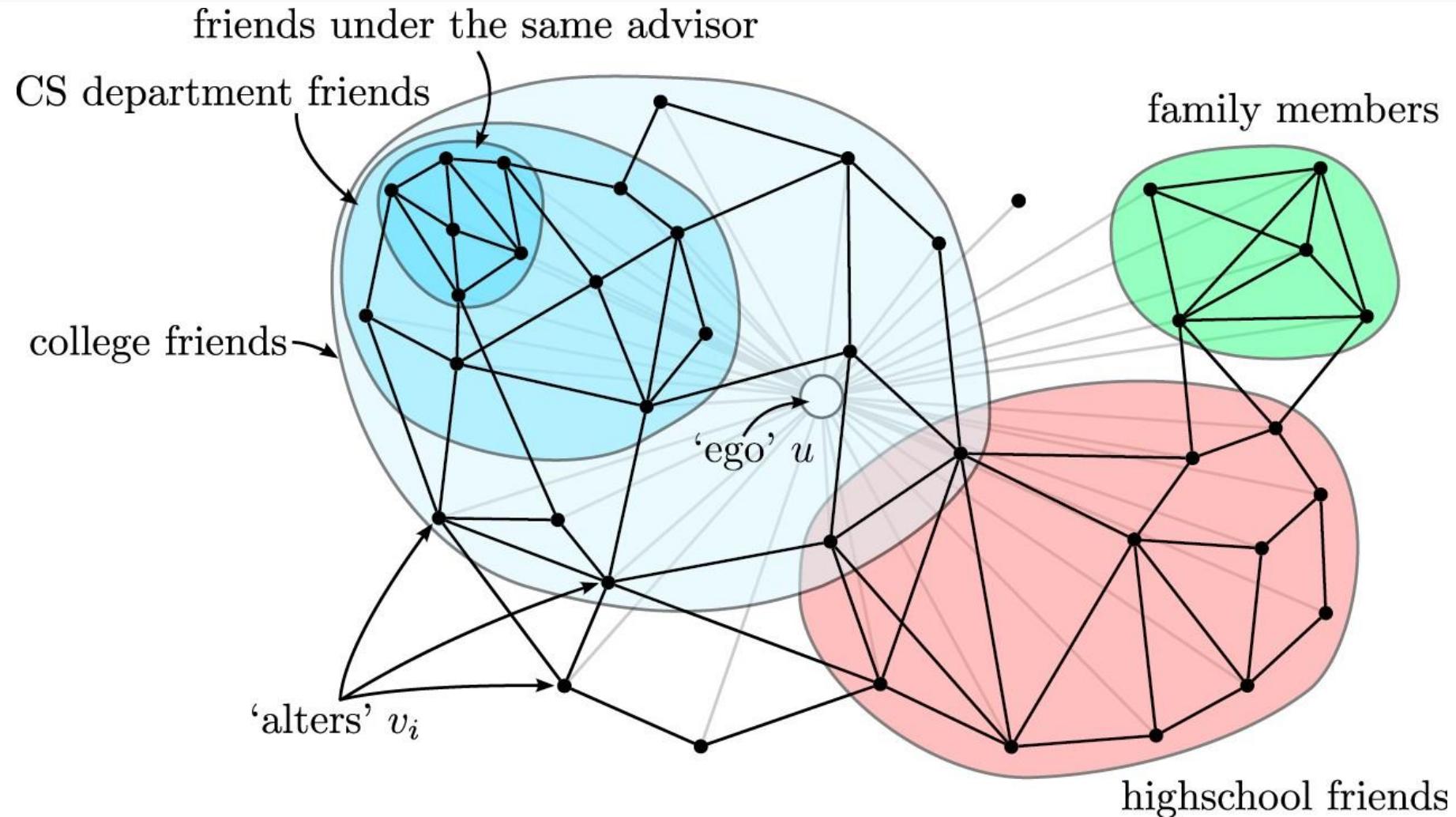
- **Input:** bipartite rating graph as a weighted signed network:
 - Nodes: users, products
 - Edges: rating scores between -1 and +1
- **Output:** set of users that give fake ratings



Red edges = -1 rating (dislike)
Green edges = +1 rating (like)

Node Classification

Application: Social Circle Detection



Discover circles and why they exist

Application: Link Prediction

Friend recommendation is link prediction



People You May Know

See all friend recommendations



Grilled Cheese
72 mutual friends



Nicolas Cage
29 mutual friends



Sarah Michelle Gellar
74 mutual friends



Stephen King
13 mutual friends

Application: Social Recommendation

Recommendation in Social E-commerce is **user behaviour prediction.**



When you receive an invitation or product recommendation from a friend, we predict whether you will adopt it or not

Application: Social Recommendation

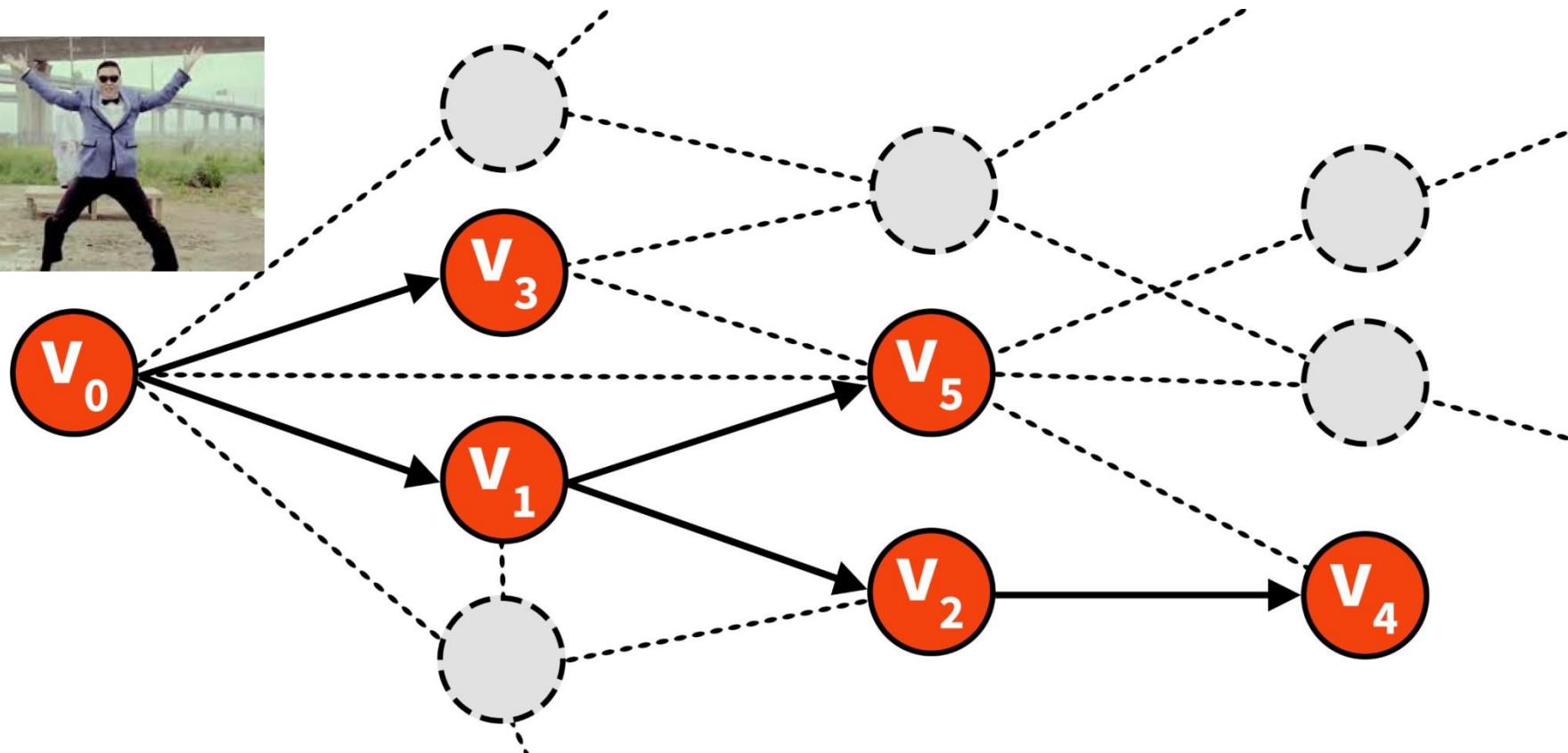


Each product has a full price and a “Group Buy” price



Once you choose "group buy", you need to invite a specific number of friends to buy the product together

Application: Predicting Vitality



Information cascade in social networks

Application: Targeted Advertisement (Marketing)

Hongzhi Yin

COVID-19 Information Center

Friends

Groups

Marketplace

Watch • 1 new video

Events

Memories

Saved

See More

Your Shortcuts

Data Mining / Machine Learning / Artificial Intelligence

MG Motor Australia
Sponsored

Australia's best selling light hatch from \$16,690 driveaway*. Offer ends 28 February. Limited stock only.



\$16,690[∞]
FROM DRIVEAWAY AUSTRALIA'S BEST SELLING LIGHT HATCH[†]

MG3 AUTO

MGMOTOR.COM.AU
MG Sale Event

Learn More

51

46 Comments 5 Shares

Like Comment Share

Privacy · Terms · Advertising · Ad Choices · Cookies ·
More · Facebook © 2021

About INFS7450

Reasoning about Social Media Data

- **What do we hope to achieve from mining social media data?**
- **Patterns** and **statistical properties** of social media data
- To predict behaviour of social media systems

Objectives of This Course

- Understand social aspects of Web 2.0 and fundamental social theories (e.g., homophily and social influence)
- Understand fundamental elements and basic concepts in social media analytics
- Acquire both the principle and hands-on practical experience of implementing social media analysing techniques such as community detection, information propagation, link prediction and network embedding

Objectives of This Course

- Use important metrics and models to characterize and measure nodes and networks
- Evaluate and compare the performance of various social media analysing algorithms and models
- Explain, analyse and discuss the discovered actionable patterns from social media data

Prerequisites

– Data Structures and Algorithms

- Search/Sort algorithms
- Graphs and Graph Algorithms (BFS and DFS, shortest path algorithm)
- Time and Space Complexity Analysis

– Good background of probability, statistics, calculus, and linear algebra

- Expectation, variance, standard deviation, Bayes rules
- Eigenvalue computation, determinants, characteristic equation
- Basic differentiation, integration, and differential equations

– Basic knowledge of data mining and machine learning

- Supervised Learning (classic classification algorithms)
- Unsupervised Learning (classic clustering algorithms)
- Evaluation methods of Machine Learning models or algorithms

– Good programming skills

- You should be able to write non-trivial programs (Python is recommended)

Quick Facts about the 2021 Offering

Course	Enrollment
INFS7450	210+

- Multiple Programs:
 - Master Data Science
 - Master Computer Science
 - Master Computer Science and Management
 - Master Information Technology
 - Master Geog Information Science
 - Master Engineering Science
 - ...

Course Lecturer

- **Course Coordinator and Lecturer**
 - A/Prof. Hongzhi Yin
 - Director of Master of Computer Science (Management)
 - Australia's leading researchers in Engineering & Computer Science
 - Field leader of Data Mining and Analysis in Australia
 - The Australian's Research 2020 Magazine
 - Office: 78-639
 - Email: h.yin1@uq.edu.au
 - <https://sites.google.com/view/hongzhi-yin/home>
- **Guest Lecturer**
 - Dr. Tong Chen (Rocky), tong.chen@uq.edu.au
 - Dr. Hongxu Chen (Jason), hongxu.chen@uts.edu.au

Tutors

- **Tutors:**
 - Mr. Xiangguo Sun (78-330, xiangguo.sun@uq.edu.au)
 - Miss. Xin Xia (78-520, x.xia@uq.edu.au)
 - Any question, seek help from your tutor first.
 - Face-to-face consultation in non-tutorial time: to book an appointment by email

Learning Activities

	Lectures	Tutorials
When	Monday 4:00-5:50PM	On-campus Session 1: Tue 2:00-3:50PM On-campus Session 2: Thu 2:00 -3:50 PM Online Session (recorded): Thu 12:00-1:50 PM
Where	Zoom	On-campus Sessions (Xin Xia): Building14-Room115 Online Session (Xiangguo Sun): Zoom

■ Tutorials:

- Week 2-13, starting from week 2
- 3 Components in Tutorials
 - Problem Solving/Question Answering
 - Lecture Extension
 - Practical Development/Coding

Attendance is not compulsory for both lectures and tutorials although your are encouraged to do so.

Course Schedule - Lectures

	Topic	Lecturer
Week1-Monday	Course Introduction	Dr. Hongzhi Yin
Week2-Monday	Review of Graph Essentials	Dr. Hongzhi Yin
Week3-Monday	Introduction to Node Measures	Dr. Hongzhi Yin
Week4-Monday	Computation of Node Centrality Measures	Dr. Hongzhi Yin
Week5-Monday	Network Measures and Models	Dr. Hongzhi Yin
Week6-Monday	Influence and Homophily	Dr. Hongzhi Yin
	Semester Break	
Week7-Monday	Network Effects and Cascading Behaviour	Dr. Tong Chen
Week8-Monday	Community Structure and Detection in Networks	Dr. Tong Chen
Week9-Monday	Public Holiday	
Week10-Tuesday	Link Prediction	Dr. Tong Chen
Week11-Monday	Network Embedding I	Dr. Hongxu Chen
Week12-Monday	Network Embedding II	Dr. Hongxu Chen
Week13-Monday	Course Review	Dr. Hongzhi Yin

Course Workload and Assessment

- **A lot** of work is expected from you! Think twice if it does not fit your schedule or match your expectation.
- **Final grade will be composed of:**
 - **Online Quiz: 20%**
 - Online Quizzes 1, 2, 3, 4 each worth 5%
 - **Course project: 30%**
 - Projects 1, 2 each worth 15%
 - **Closed Book Final Exam: 50%**
 - **ProctorU** online invigilated exam
- **In order to pass this course, you need “double pass”**
 - **At least 50 marks in total, and**
 - **At least 25 marks in the final exam**

Assessment

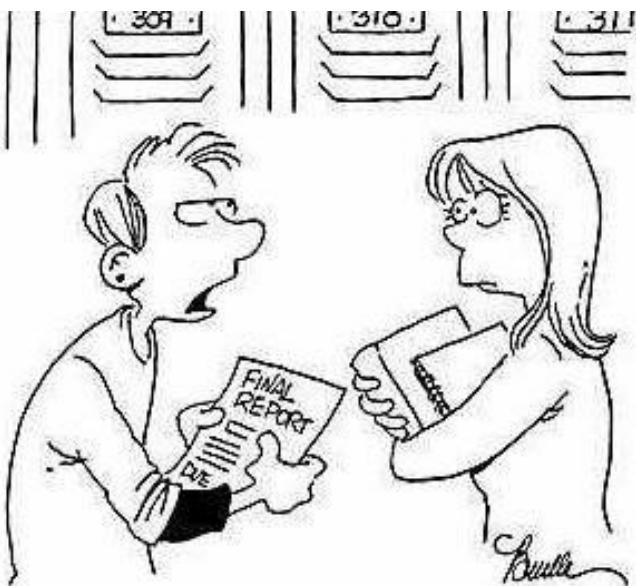
- ▶ **ProctorU online invigilated exam**
 - ▶ <https://my.uq.edu.au/information-and-services/manage-my-program/exams-and-assessment/online-supervised-invigilated-exams>
 - ▶ <https://my.uq.edu.au/information-and-services/student-support/proctoru-faq>
 - ▶ I would prefer not to use my personal computer to sit my ProctorU exam. Is it possible to use University equipment?
 - ▶ Refer to <https://my.uq.edu.au/information-and-services/student-support/proctoru-faq>
- ▶ Projects are long and may take a lot of time. **Start Early!**
 - ▶ A combination of data analysis, algorithm design and implementation, and evaluation
 - ▶ Upload your codes and reports to blackboard by the due
 - ▶ As for late submissions and extension, please refer to ECP

Assessment-Online Quizzes

- ▶ **Format:** Multiple-choice and Short answer.
- ▶ **Place:** You can finish each online quiz anywhere.
- ▶ **Duration:** Each quiz has a time limit of 120 minutes.
- ▶ **Timer Setting:** It will save and submit automatically when the time expires.
- ▶ **Force Completion:** Once started, this test must be completed in one sitting. Do not leave the test before clicking Save and Submit.
- ▶ **Multiple Attempts:** Each quiz allows two attempts, and the higher mark will be counted.
- ▶ **Marking:** Marking will be automatically done online. You can get your marks immediately after you submit your answers.

Plagiarism detection

- ▶ All assignments are to be done individually and must be your own work.
- ▶ You are encouraged to form discussion groups to solve problems; however, when writing and programming, write in your own words and provide your own codes.
- ▶ You should not look at the code of any other student. You must sufficiently protect all electronic and paper copies of your code.
- ▶ All submitted codes and reports will be subject to electronic plagiarism.
- ▶ Assignments with no academic merit will be awarded a mark of zero (for all students no matter you copy others or are copied from)



"I don't know what plagiarizing is, so I'm gonna take the easy way out and just copy something off the internet."

Image source: <https://www.pinterest.com.au/wassef87/academic-dishonesty-and-integrity/>

Ignorance is not a defense!

Get familiar with Academic Integrity at UQ

Don't risk getting on the
academic misconduct register

<https://www.uq.edu.au/integrity/>

Course Schedule - Assessments

Assignments	Release Date (Brisbane Time)	Due Date (Brisbane Time)
Online Quiz 1	Monday, 01/03/2021	08/03/2021-16:00
Online Quiz 2	Monday, 08/03/2021	22/03/2021-16:00
Online Quiz 3	Monday, 22/03/2021	29/03/2021-16:00
Online Quiz 4	Monday, 29/03/2021	05/04/2021-16:00
Project 1	Monday, 15/03/2021	19/04/2021-16:00
Project 2	Tuesday, 04/05/2021	28/05/2021-16:00

Course Website – Blackboard

- **Lectures, Tutorials and Their Recordings**
 - Slides and Zoom links posted at the night before the lecture and tutorial sessions respectively;
 - Their recordings will be available on Blackboard system.
- **Assignments**
 - Both online quizzes and projects will be released and submitted via Blackboard system
- **Readings**
 - Text book: Social Media Mining: An Introduction (Cambridge University Press)
 - Optional book reading: Networks, Mark Newman, Oxford University Press, 2010
 - Related Research Papers
 - This will be very helpful for you to finish projects and achieve high marks.



Week 1



Week 1 Lecture Notes: Course Introduction

Attached Files:  INFS7450-Week1.pdf  (4.242 MB)

Introduction to social media analytics and course logistics



Week 1 Lecture Zoom Link

Join from PC, Mac, Linux, iOS or Android: <https://uqz.zoom.us/j/83811784005>

Or iPhone one-tap (Australia Toll): +61280152088,83811784005#

Or Telephone:

Dial: +61 2 8015 2088

Meeting ID: 838 1178 4005

International numbers available: <https://uqz.zoom.us/u/k3jC49Ja>

Dial by your location:

+61 2 8015 6011 Australia

+61 3 7018 2005 Australia

+61 7 3185 3730 Australia

+61 8 6119 3900 Australia

+61 8 7150 1149 Australia

Or a Videoconferencing (H.323/SIP) room system:

Dial: 83811784005@zoom.aarnet.edu.au

or 0262227588@zoom.aarnet.edu.au and enter your Meeting ID: 83811784005

or 103.122.166.55 (Australia) and enter your Meeting ID: 83811784005

Or Skype for Business (Lync):

SIP:83811784005@lync.zoom.us

Communication

- All announcements and reminders about the deadline and due date will be posted through **Blackboard**
- Please check your UQ email on regular basis. Excuses related to not checking emails, not reading lecturer notes, etc. will not be accepted.
- **Piazza** will be used for discussions, queries and questions
 - Emails to the Tutor for private questions; all other questions should be posted to Piazza
 - Students are encouraged to help each other on Piazza
 - Piazza will be monitored by the tutors
 - If you have not received the Piazza invitation email for this course, please contact Xiangguo (xiangguo.sun@uq.edu.au)

Tips for Learning This Course

- **READ** the lecture notes before the lecture
- **REFER** to them during the lecture and make notes
- **REVIEW** them again after the lecture
- Get your hands dirty by implementing the algorithms and models covered in this course
 - Coding practice is quite important

References

- R. Zafarani, M. A. Abbasi, and H. Liu, Social Media Mining: An Introduction, Cambridge University Press, 2014.
- <http://socialmediamining.info/>