

CS 579: Online Social Network Analysis

Introduction

Kai Shu

Spring 2022

Course Objectives

- Introducing the basic
 - Social Media Mining (SMM)
- Learning the state of the art
 - E.g., graph modeling, adversarial learning, ...
- Applying what we learn
 - Homework assignments and Projects
- Sharing and participating
 - Sample project presentation (learning what others do)
 - Inviting experts to share their research and experience
 - Offering your ideas, information, and feedback

Course Workload and Evaluation

- We aim high
 - Following the textbook
 - 3 homework assignments and 2 projects
 - Advanced Topics (1-2)
 - The advanced research problems that researchers and practitioners are working on
 - Exams and Reviews (2)
 - Projects and short reports
 - How do we grade? Curve or not?
 - Late penalty:
 - Exponential penalty: d - #of days, $-\sum 2^{(d-1)}$

- **Academic integrity**

<https://web.iit.edu/provost/statement-academic-integrity>

Social Media Mining, Reza Zafarani, Mohammad-Ali Abbasi, Huan Liu, Cambridge University Press, 2014

KDnuggets™ Top Stories, Jun 2, 2018

Featured Story

- **10 More Free Must-Read Books for Machine Learning and Data Science**



Communication Channels and Schedule

- Announcements are made regularly in Blackboard
- Emails will be sent out on a need basis
- Weekly Schedule - Please visit Bb for Course Documents
- After-class Blogs (i.e., Discussion Board)
- Office hours (See Bb)
- You're most welcome to share your suggestions and feedback
- We aim to help you succeed in this competitive age with some unique knowledge and skills!

What is this course about?

- Who is this instructor?
 - Kai Shu, and he has a webpage 😊
 - Assisted by TAs *Canyu Chen* and *Ayush Garg*
- For whom is this course designed?
 - Senior undergraduate and graduate students
 - in particular, for those who want to do research with data science, machine learning, social computing
- Set your goals of attending this course
 - to make you **special** in the age of *data mining* and *machine learning*, or *AI*
- Share your ideas and concerns with us

Social Media

The screenshot shows the Amazon.com homepage with a browser window at the top displaying the URL www.amazon.com. The main navigation bar includes the Amazon logo, links to 'Your Amazon.com', 'Today's Deals', 'Gift Cards', and 'Help'. A search bar is prominently displayed with a 'Go' button. To the right of the search bar are links for 'Hello. Sign In Your Account', a shopping cart icon with '0' items, and a 'Wish List' link. A banner for 'FREE Two-Day Shipping' with a link to 'Join Amazon Prime Today' is located in the top right corner. Below the navigation bar, a horizontal bar promotes 'Amazon Instant Video: The latest TV shows, available instantly.' with a link to 'EXPAND TO LEARN MORE'. The main content area features a row of category links: 'Instant Video', 'MP3 Store', 'Cloud Player', 'Kindle', 'Cloud Drive', 'Appstore for Android', 'Digital Games & Software', and 'Audible Audiobooks'. The central focus is on two Kindle devices: the 'The All-New kindle fire HD' described as 'The ultimate HD experience' for \$199, and the 'Introducing kindle paperwhite' described as 'The world's most advanced e-reader' for \$119. To the right of these is a 'Friends & Family Gifting' section with a Facebook icon and a link to 'Learn more'. Below the Kindle promotions is a section for 'THE AMAZON CLOTHING STORE' titled 'DRESS SHOP', featuring images of models in dresses and links to 'Shop Dresses' and 'Shop All Clothing'. On the right side of the page, there is a 'Hundreds of Free Songs' promotion for \$0, a 'Gold Box Deal of the Day' for \$1.99 Kindle Inspirational Memoirs, and an 'amazon MP3' logo. The bottom right corner of the page is marked as an 'Advertisement'.

Amazon.com: Online Shopping

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Your Amazon.com | Today's Deals | Gift Cards | Help

Shop by Department

Search All

Go

Hello. Sign In Your Account

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Wish List

FREE Two-Day Shipping
Join Amazon Prime Today

Amazon Instant Video: The latest TV shows, available instantly. EXPAND TO LEARN MORE

Instant Video | MP3 Store | Cloud Player | Kindle | Cloud Drive | Appstore for Android | Digital Games & Software | Audible Audiobooks

The All-New kindle fire HD
The ultimate HD experience
From \$199 > Shop now

Introducing kindle paperwhite
The world's most advanced e-reader
From \$119 > Shop now

Friends & Family Gifting
f Gift Connections Made Easy > Learn more

Hundreds of Free Songs
Play on the Web, Android, and Kindle Fire
Shop now

amazon MP3


Advertisement

Gold Box Deal of the Day
\$1.99 Kindle Inspirational Memoirs and More

THE AMAZON CLOTHING STORE
DRESS SHOP
The season's biggest trends from Calvin Klein, BCBGMAXAZRIA, Tracy Reese, and more.
> Shop Dresses
> Shop All Clothing

English ▾

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Atlanta	Denver
Austin	Detroit
Berlin	Dublin
Boston	Honolulu
Chicago	Houston

Yelp Berkeley

Search for (e.g. taco, cheap dinner, Max's)

san francisco restaurants

- San Francisco Community Acupuncture
- San Francisco Food Bank
- San Francisco Symphony
- san francisco restaurants**
- San Francisco Movie Tours
- San Francisco Marriott Fishermans Wharf
- San Francisco Gay Wedding Video
- San Francisco Soup Company
- San Francisco Test Only Smog
- San Francisco CityPASS

Near (Address, Neighborhood, City, State or Zip)

San Francisco, CA

Search

Talk Events Member Search

Hide

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Portland	Seattle
Saint Louis	Toronto
San Diego	Vancouver
San Francisco	Washington, DC
	More Cities »

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 **Best of yelp**

Restaurants
4505 reviewed



1. La Bedaine
2. Kingston 11 Cuisine
3. Vital Vittles
4. Cheese Board Pizza
5. Emilia's Pizzeria

...see more »

Nightlife
881 reviewed

Shopping
4852 reviewed



1. Chestnut & Vine Floral...
2. Waterside Workshops
3. UniFormal & UniEleganza Tuxedo...
4. Lee's Florist & Nursery
5. Supple Integrative Skin Care

...see more »

Beauty and Spas
2566 reviewed

Browse by Category

- Restaurants
- Food
- Nightlife
- Shopping
- Beauty and Spas
- Arts & Entertainment
- Event Planning & Services
- Health and Medical
- Active Life
- Hotels & Travel
- Automotive
- Home Services
- Local Services
- Local Flavor
- Pets
- Education

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Review of the Day **Archive »**

Voted by our members!



★★★★★

Dopo

*Cozy, romantic little neighborhood spot. Nice location right across from good ol' Fenton's. No reservations at this little place. so either come a little

The screenshot shows a web browser window with multiple tabs open, including Gmail, FedEx tracking, and Twitter. The active tab is Twitter, displaying the 'Who to follow' page for the user 'dgreatwood'. The page is filtered by 'technology' interests, showing 60 results. The left sidebar contains navigation links like 'View Suggestions', 'Browse Interests', and 'Find Friends'. The main content area lists several users to follow, each with a profile picture, name, bio, and a 'Follow' button. The right sidebar shows 'You recently followed' users, 'Similar to Michelle Cale' suggestions, 'You recently viewed' users, and an 'Invite Friends' section. At the bottom, there are 'Related Services' like Microsoft and LinkedIn, and a footer with various links and the copyright notice '© 2011 Twitter'.

Who to follow find users by name Search

[View Suggestions](#) **Browse Interests** [Find Friends](#)

View Technology (60)

[Art & Design](#) · [Books](#) · [Business](#) · [Charity](#) · [Deals](#) · [Entertainment](#) · [Family](#) · [Fashion](#) · [Food & Drink](#) · [Funny](#) · [Health](#) · [Music](#) · [News](#) · [Politics](#) · [Science](#) · [Sports](#) · [Staff Picks](#) · [Staff Picks: NFL Playoffs](#) · [Technology](#) · [Travel](#) · [Twitter](#)

guardiantech Guardian Tech
News and comment from the Guardian's technology team [Follow](#)

kaifulee Kai-Fu Lee
I am the CEO of Innovation Works (www.innovation-works.com). I used to work at Microsoft, SGI, Apple, and Google. I have written several Chinese books. [Follow](#)

sacca Chris Sacca
I'm an investor in Twitter & other startups. Learn more at www.lowercasellc.com. Just finished bicycling across the USA and am thinking about my next adventure. [Follow](#)

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You recently followed [View All](#)

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GlobalFundWomen Global Fund for Women [Follow](#)
Largest global grantmaker exclusively funding women's rights. Committed to a world of equality & social justice.

nockee Chris [Follow](#)
Ultracyclist and endurance junkie. Did Race Across Oregon and Hoodoo 500 Voyager in 2009. Doing RAW solo in 2011

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Kevin Steger

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spoonen [Follow](#)
Sanjay Poonen

Stratalux [Follow](#)
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Invite Friends

Not finding who you're looking for? Invite friends to Twitter via email. [See what you'll send them.](#)

your friend's email address [Invite](#)

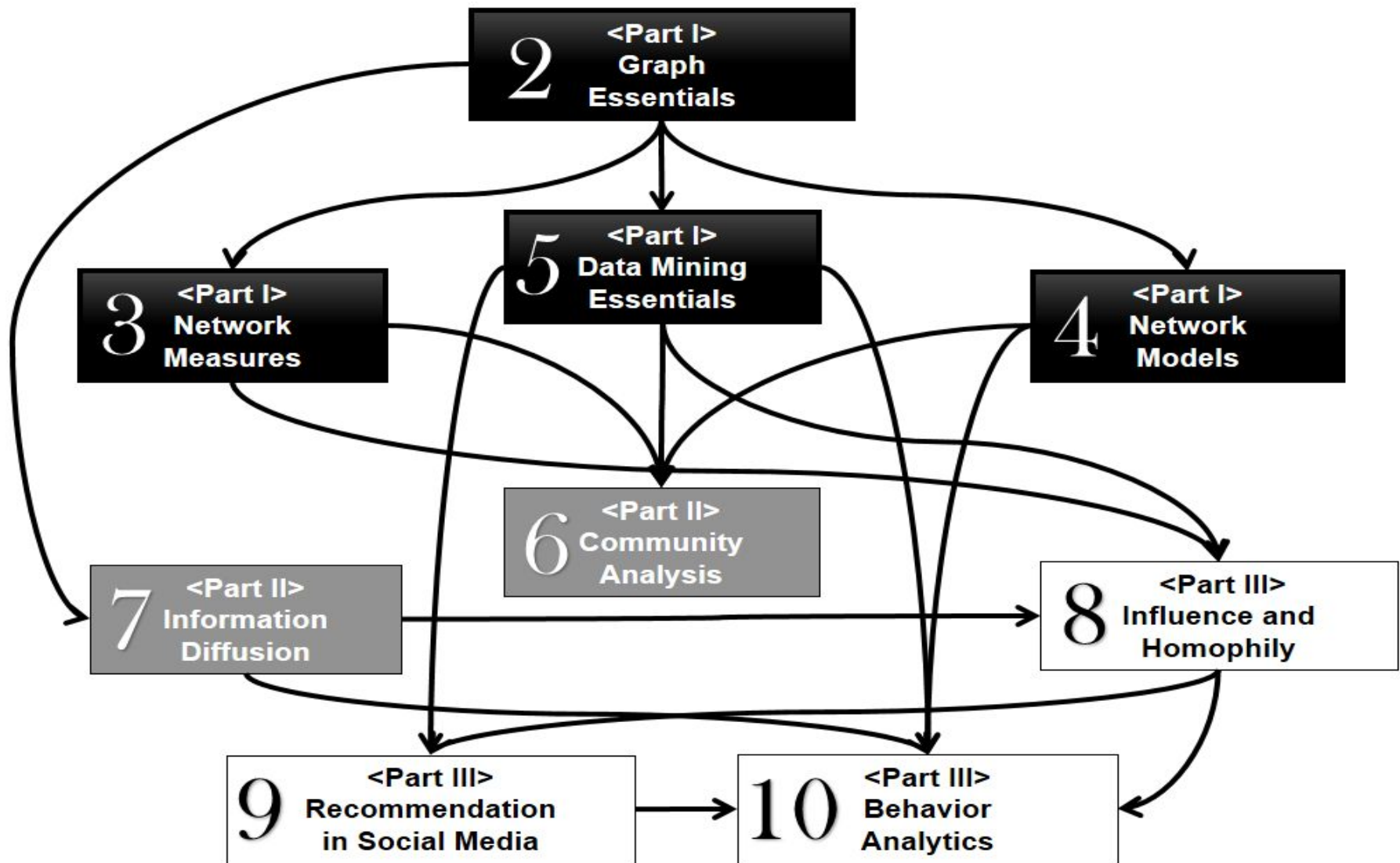
Lots of people to invite? Separate multiple email addresses with commas.

Related Services

Microsoft · Bing Social's Recommendations for Influential Twitter Users.
LinkedIn · Find your LinkedIn colleagues who use Twitter.

[About](#) · [Help](#) · [Blog](#) · [Status](#) · [Jobs](#) · [Terms](#) · [Privacy](#) · [Shortcuts](#)
[Advertisers](#) · [Businesses](#) · [Media](#) · [Developers](#) · [Resources](#) · © 2011 Twitter

Overview – Dependency Graph



Definition

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

Social Media Landscape

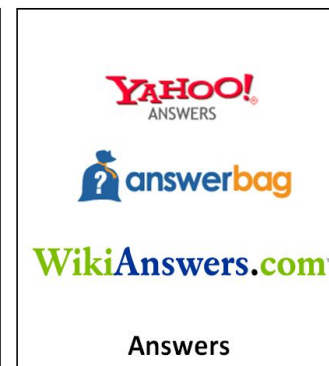
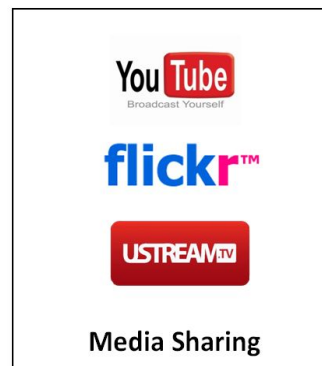
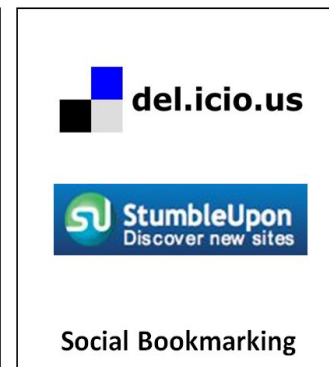


Social Media: Examples

- A wiki article
- Web reviews and ratings of a popular pizza place in your city
 - E.g., Yelp.com
- An online social network of your professional contacts
 - E.g., Facebook.com, LinkedIn.com
- An iPhone application that informs you where parking is likely available
 - FasPark

Types of Social Media

- Online Social Networking
- Publishing
 - Blogging
 - Wiki
- Micro blogging
- Social News
- Social Bookmarking
- Media Sharing
 - Video Sharing
 - Photo Sharing
 - Podcast Sharing
- Opinion, Review, and Ratings Websites
- Answers
- Entertainment



Online Social Networking

Online Social Networks are web-based services that allow individuals and communities to connect with real world friends and acquaintances online

- Interactions
 - Friendship interaction
 - Friends, like, comments, ...
 - Media Sharing
 - Sending and receiving messages

- Examples
 - Facebook.com
 - VK.com
 - Snap.com



Blogging

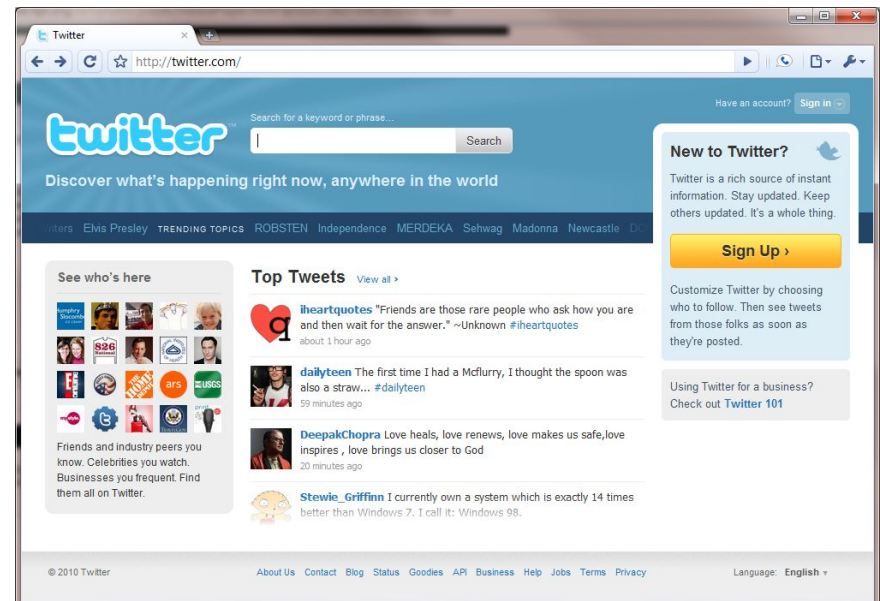
A blog is a journal-like website for users, a.k.a. bloggers, to contribute textual and multimedia content, arranged in reverse chronological order

- Maintained both **individually** or by a **community**
- Usages:
 - Sharing information and opinions with friends and strangers
 - Disseminating subject-specific content
 - Who is the influential

Microblogging

Microblogging is a relatively new phenomenon that can be considered as a counterpart to blogging, but with **limited content**

- Usage
 - communication medium
 - social interaction
 - citizen journalism
- Service Providers:
 - Twitter
 - Google buzz



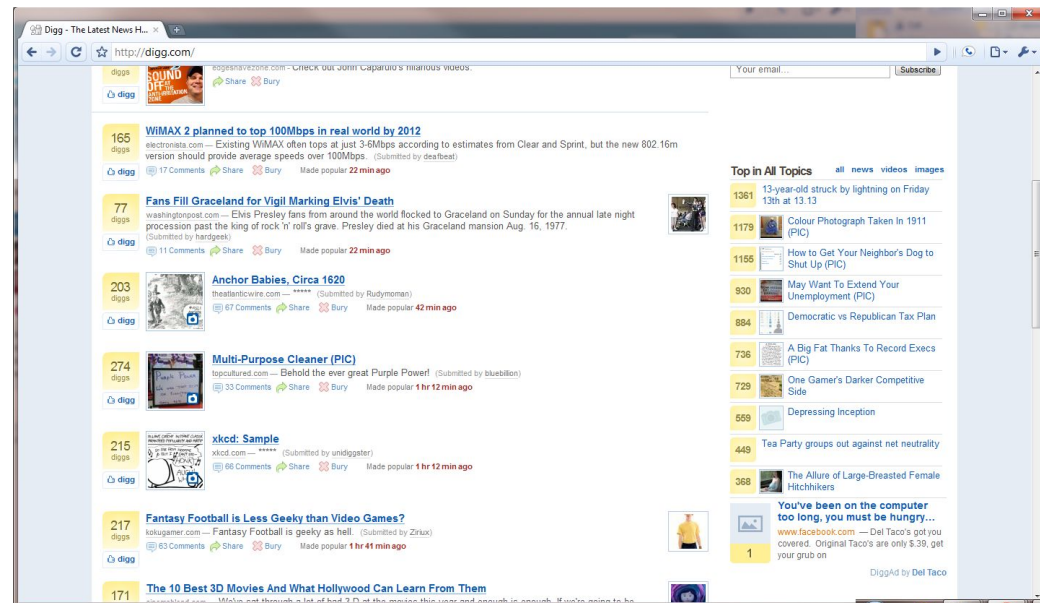
A wiki is a collaborative editing environment that allows users to develop Web pages using a simplified markup language

- Wikipedia allows interested individuals to collaboratively develop articles on a variety of subjects.
- Using the wisdom of crowds effectively, it has become a comprehensive repository of information useful to a variety of individuals

Social News

Social News refers to the sharing and selection of news stories and articles by a community of users.

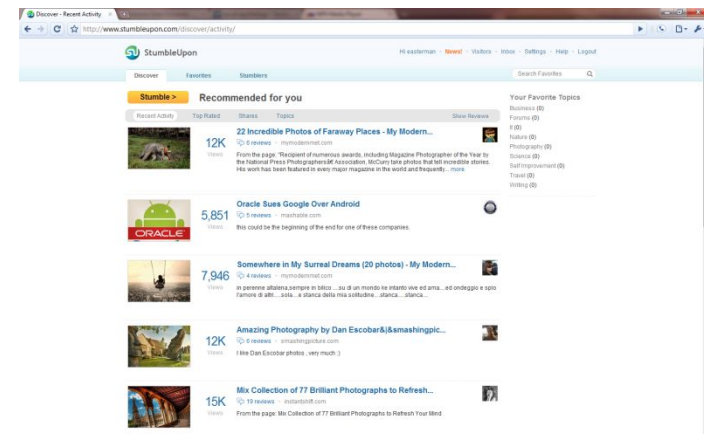
- Users can share articles that they believe would interest the community
- Examples:
 - Digg.com
 - Slashdot
 - Fark
 - Reddit



Social Bookmarking

Social Bookmarking sites allow users to bookmark web content for storage, organization and sharing.

- These bookmarks can be tagged with metadata to categorize and provide context to the shared content, allowing users to organize information making it easy to search and identify relevant information.
- Examples
 - Delicious.com
 - StumbleUpon.com

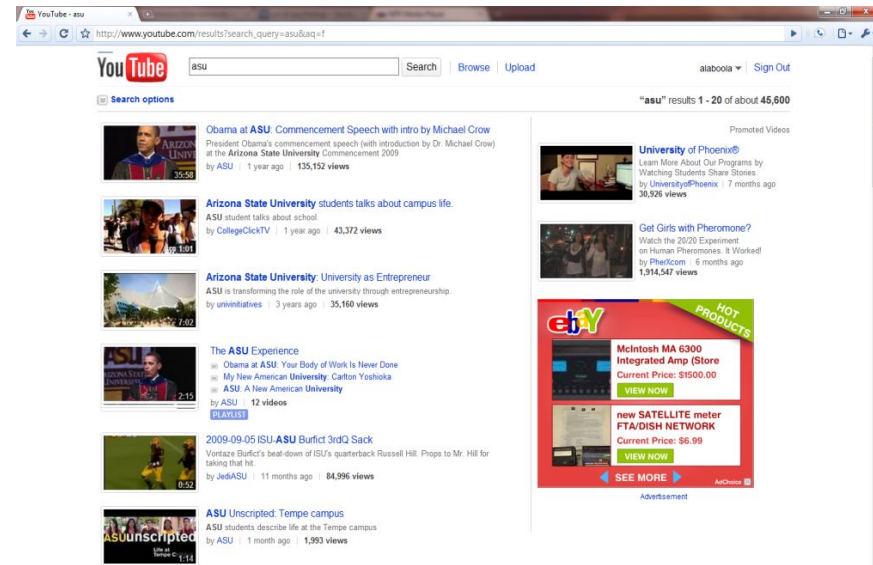


Media Sharing

Media sharing is an umbrella term that refers to the sharing of a variety of media on the web.

Users share such **multimedia content** of possible interest to others

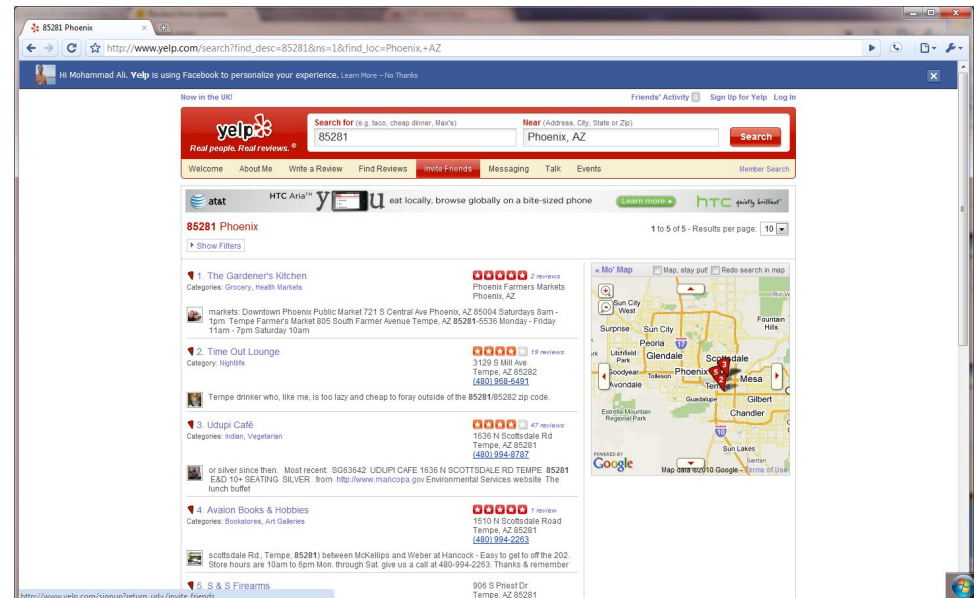
- Examples
 - Video Sharing:
 - YouTube.com
 - Photo Sharing:
 - Flickr.com, picasa.com
 - Document Sharing:
 - Scribd.com, Slideshare.com
 - Livecasting:
 - Justin.tv, Ustream.com



Opinion, Review, and Ratings Websites

Opinion, review, and ratings websites are websites whose primary function is to collect and publish **user-submitted content** in the form of subjective commentary on existing products, services, entertainment, businesses, places, etc.

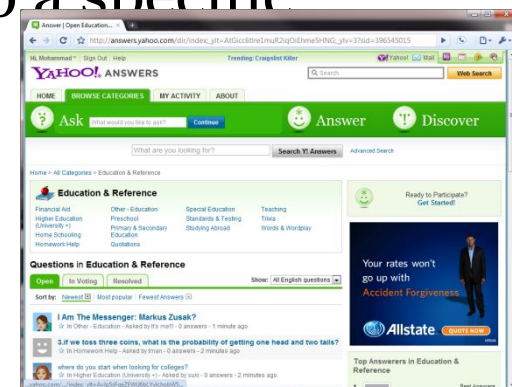
- Examples
 - Cnet.com
 - Epinions.com
 - yelp.com
 - tripadvisor.com



Socially-Provided Answers

In these sites, users who require certain guidance, advice or knowledge can ask **questions**. Other users from the community can answer these questions based on knowledge acquired from previous experiences, personal opinions or from relevant research.

- Unlike review and opinion sites, which contain self-motivated contribution of opinions, answer sites contain knowledge shared in response to a specific query.
- Examples:
 - WikiAnswers, Yahoo Answers



Main Characteristics of Social Media

- **Participation**
 - social media encourages contributions and feedback from everyone who is interested. It blurs the line between media and audience.
- **Openness**
 - most social media services are open to feedback and participation. They encourage voting, comments and the sharing of information. There are rarely any barriers to accessing and making use of content – password-protected content is frowned on.
- **Conversation**
 - whereas traditional media is about “broadcast” (content transmitted or 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.
- **Connectedness**
 - most kinds of social media thrive on their connectedness, making use of links to other sites, resources and people.

Social Media Mining is the process of representing, analyzing, and extracting meaningful patterns from social media data

Some Challenges in Social Media Mining

1. Big Data Paradox

1. Social media data is big, yet not evenly distributed.
2. Often little data is available for an individual

2. Obtaining Sufficient Samples

1. Are our samples reliable representatives of the full data?

3. Noise Removal Fallacy

1. Too much removal makes data more sparse
2. Noise definition is relative and complicated and is task-dependent

4. Evaluation Dilemma

1. When there is no ground truth, how can you evaluate?

5. Social Data Bias