Unlocking the Potential of Social Media through Text Mining

Tim Baldwin

THE UNIVERSITY OF MELBOURNE

Taking Credit for a Cast of Thousands

- This is joint work with Paul Cook, Aaron Harwood, Bo Han, Shanika Karunasekera, Su Nam Kim, Marco Lui, David Martinez, Joakim Nivre, Richard Penman, Li Wang, ...

Talk Outline

What is Social Media?

- According to Wikipedia (20/8/2012), social media is:

  Social media includes web- and mobile-based technologies which are used to turn communication into interactive dialogue among organizations, communities, and individuals. Andreas Kaplan and Michael Haenlein define social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content."

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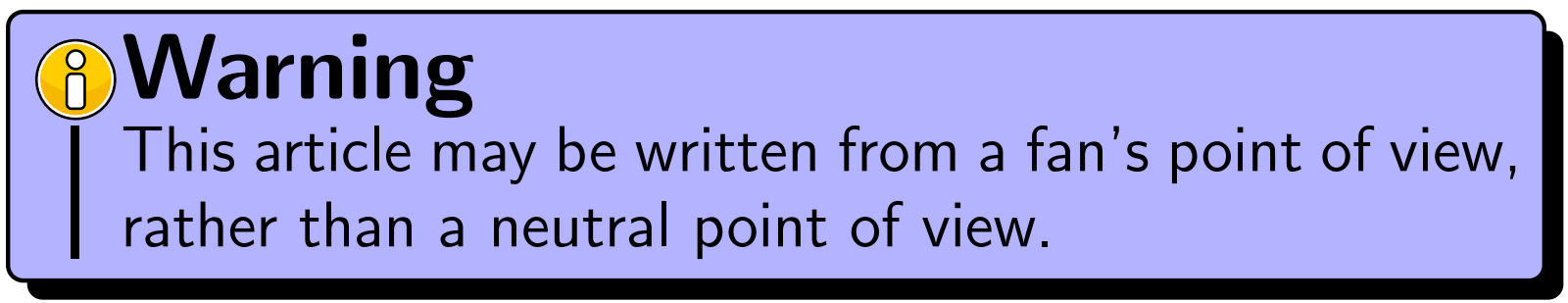


Social Media Include ...

Social Networking sites

posts, friends/circles, "likes", shares, events, photos, comments, geotags, ...

Source(s): `http://mashable.com/2011/02/04/facebook-7th-birthday/`

Social Media Include ...

Micro-blogs

posts, followers/followees, shares, hashtagging, geotags, ...

Source(s): `http://itunes.apple.com/us/app/twitter/`

Social Media Include ...

Web user forums

posts, threading, followers/followees, ...

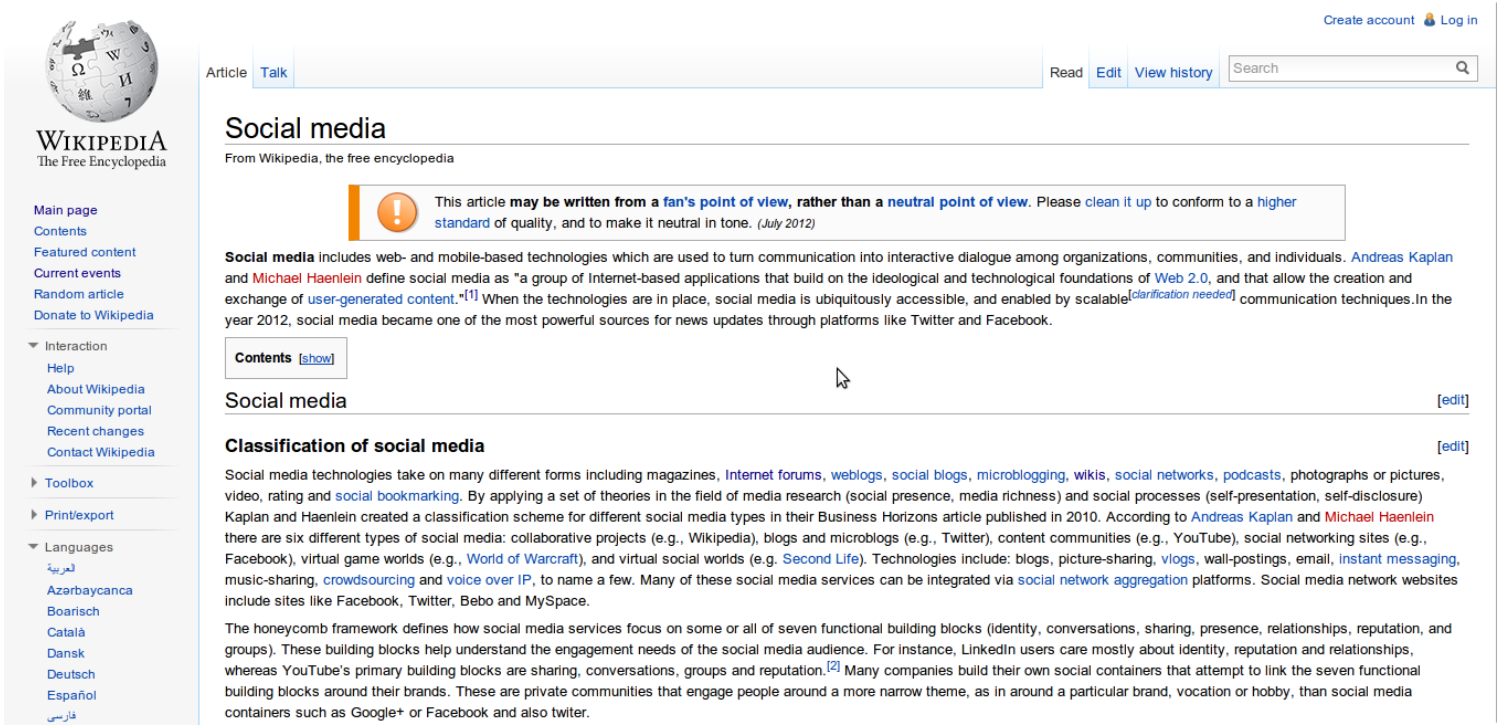
Source(s):

`http://http://forums.cnet.com/7723-6617_102-570394/ubuntu-running-minecraft/`

Social Media Include ...

Wikis

posts, versioning, linking, tagging, ...



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Languages
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Boarisch
Català
Dansk
Deutsch
Español
فارسی

Social media

From Wikipedia, the free encyclopedia

This article **may be written from a fan's point of view, rather than a neutral point of view.** Please clean it up to conform to a higher standard of quality, and to make it neutral in tone. *(July 2012)*

Social media includes web- and mobile-based technologies which are used to turn communication into interactive dialogue among organizations, communities, and individuals. Andreas Kaplan and Michael Haenlein define social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content."[1] When the technologies are in place, social media is ubiquitously accessible, and enabled by scalable[*clarification needed*] communication techniques.In the year 2012, social media became one of the most powerful sources for news updates through platforms like Twitter and Facebook.

Contents [show]

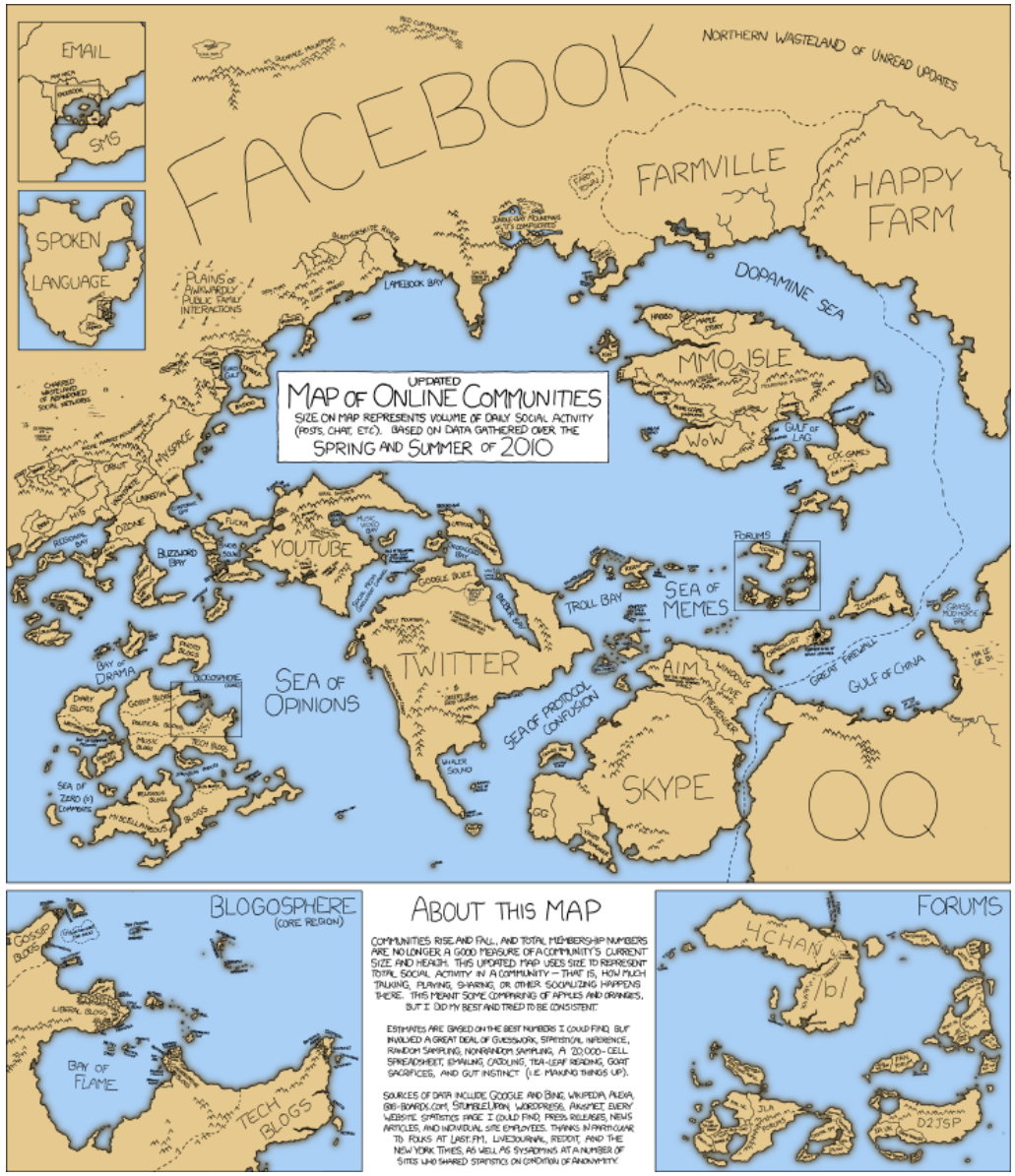
Social media [edit]

Classification of social media [edit]

Social media technologies take on many different forms including magazines, Internet forums, weblogs, social blogs, microblogging, wikis, social networks, podcasts, photographs or pictures, video, rating and social bookmarking. By applying a set of theories in the field of media research (social presence, media richness) and social processes (self-presentation, self-disclosure) Kaplan and Haenlein created a classification scheme for different social media types in their Business Horizons article published in 2010. According to Andreas Kaplan and Michael Haenlein there are six different types of social media: collaborative projects (e.g., Wikipedia), blogs and microblogs (e.g., Twitter), content communities (e.g., YouTube), social networking sites (e.g., Facebook), virtual game worlds (e.g., World of Warcraft), and virtual social worlds (e.g. Second Life). Technologies include: blogs, picture-sharing, vlogs, wall-postings, email, instant messaging, music-sharing, crowdsourcing and voice over IP, to name a few. Many of these social media services can be integrated via social network aggregation platforms. Social media network websites include sites like Facebook, Twitter, Bebo and MySpace.

The honeycomb framework defines how social media services focus on some or all of seven functional building blocks (identity, conversations, sharing, presence, relationships, reputation, and groups). These building blocks help understand the engagement needs of the social media audience. For instance, LinkedIn users care mostly about identity, reputation and relationships, whereas YouTube's primary building blocks are sharing, conversations, groups and reputation.[2] Many companies build their own social containers that attempt to link the seven functional building blocks around their brands. These are private communities that engage people around a more narrow theme, as in around a particular brand, vocation or hobby, than social media containers such as Google+ or Facebook and also twiter.

Source(s): `http://en.wikipedia.org/wiki/Social_media`



Source(s): `http://xkcd.com/802/`

Common Features of Social Media

- Posts
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- Cross-post/user linking
- Social tagging
- Comments

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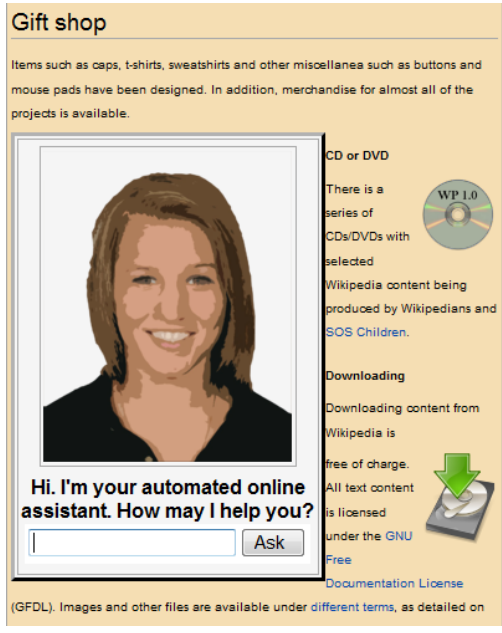
- Comments
- Author information, and linking to user profile features
- Aggregation/ease of access

Research on Social Media Data

- Social network analysis
- Friendship prediction/recommendation
- Search over social media data
- Social influence/dynamics
- Information dispersion
- Text mining/language technology variously ...

What is Language Technology?

- **Big hairy aim:** machine understanding of natural language data/"translation" of text into different modalities
- Sample tasks: machine translation, question answering, sentiment analysis, dialogue systems, syntactic parsing



Source(s): `http://en.wikipedia.org/wiki/File:Automated_online_assistant.png`

Language Technology

Source(s): `http://itallchanges.com/wp-content/uploads/2011/06/smartphone.gif`

Standard Assumptions Made in LT Research

- Edited text
- Static data
- Long(ish) documents; plenty of context
- All context is language context
- Well-defined domain/genre
- Sentence tokenisation
- Grammaticality
- Most of what glitters is English (and if your method can handle one language, it can handle 'em all)

LT Challenges in Social Media Data

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- What's a sentence?
- Yer what?
- Anything goes — lots of languages, multilingual documents, ad hoc spelling, mix of language and markup ... language anarchy!

Talk Outline

Language Identification

- Language identification (langid) = prediction of the language(s) a given message is authored in

? Example

karena ada rencana ke javanet, maka siap-kan link dolodan, di bookmark, ready to be a bandwidth killer.. siap siaplah javanet, im coming..

Language(s): ?

Source(s): Baldwin and Lui [2010], Lui and Baldwin [2011, 2012]

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Language(s): MS,EN

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- Challenge: learn a model which works well over any document and any language

Twitter-specific LangID: Priors, Priors Everywhere

Source(s): Carter et al. [to appear]

- Performing langid message-by-message is all well and good, but surely we can get something extra out of learning language preferences for the:
  - user
  - location of the user post(s)
  - followers/followees
  - hashtags
  - user mentions
  - documents linked to by the user
  - timestamp
  - message length
  - ⋮

Language Identification: Bragfest

- `langid.py`: Python-based library for language identification
- Best off-the-shelf message-level solution for Twitter; proven results over TREC 2011 microblog task
- Fast as
- Easy as (to use)

Lexical Normalisation

Source(s): Han and Baldwin [2011], Han et al. [2012], Gouws et al. [2011], Liu et al. [2011, 2012]

- Lexical normalisation = "spell-correct" (English) messages to "canonical" lexical form:

? Example

If you a GIrl and you dont kno how to Cook yo bf should Leave you rite away

↓

If you a girl and you don't know how to cook your boyfriend should leave you rite away

Lexical Normalisation: Method and Bragfest

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- Best published results for detection + normalisation; mixed results in IR setting
- **Resources:** lexical normalisation dictionary; lexical normalisation dataset

Geolocation

- What is the most likely geolocation for a message/user?

? Example

- Posts:
  - *Currently seated in the drunk people section. #sober*
  - *RT SFGiants: Sergio Romo's scoreless steak is snapped at 21.2 innings as he allows 1 run in the 8th. #SFGiants still hold 2-1 lead.*
  - *kettle corn guy featured on sportscenter!! #Sfgiants*
- User location: ?

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- User location: Fresno, CA

Geolocation: Methodology and Bragfest

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- Current state-of-the-art: city-level accuracy of around 18%(!)

Source(s): Wing and Baldridge [2011], Roller et al. [2012]

Talk Outline

User Forum Mining

Example Thread: The Complexity of User Forums

HTML Input Code - CNET Coding & scripting Forums

User A Post 1	**HTML Input Code** ...Please can someone tell me how to create an input box that asks the user to enter their ID, and then allows them to press go. It will then redirect to the page ...
User B Post 2	**Re: html input code** Part 1: create a form with a text field. See ... Part 2: give it a Javascript action
User C Post 3	**asp.net c\# video** I've prepared for you video.link click ...
User A Post 4	**Thank You!** Thanks a lot for that ... I have Microsoft Visual Studio 6, what program should I do this in? Lastly, how do I actually include this in my site? ...
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External Link

External Video

Task Description

Task orientation: is the thread focused on solving a specific problem?

Completeness: does the initial post include a sufficiently detailed specification of the problem for a third party to be able to realistically provide a solution?

Solvedness: is there a documented solution to the original problem described by the thread initiator within the thread?

Spam: is the thread spam?

Problem type: free text keyword description of the type of problem described (e.g. *software*

Thread Classification Example

APT-Get Repositories For Mandrake

`Igman`	Hi, i was wondering where i can find some Apt-Get repositoreis for mandrake 9.1?
`salparadise`	mandrake 9/9.1 uses urpmi the following page is where you want to go `http://plf.zarb.org/~nanardon/index.php`

Task orientation (1-5): ☐

Completeness (1-5): ☐

Solvedness (1-5): ☐

Spam? ☐

Problem type: ☐

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3. Apply the trained model to test data

Results/Bragfest

- Largely "sobering" results (around baseline)
- **Resources:** labelled dataset with data from a range of Linux forums/mailing lists
- Cute logo:

Results/Bragfest

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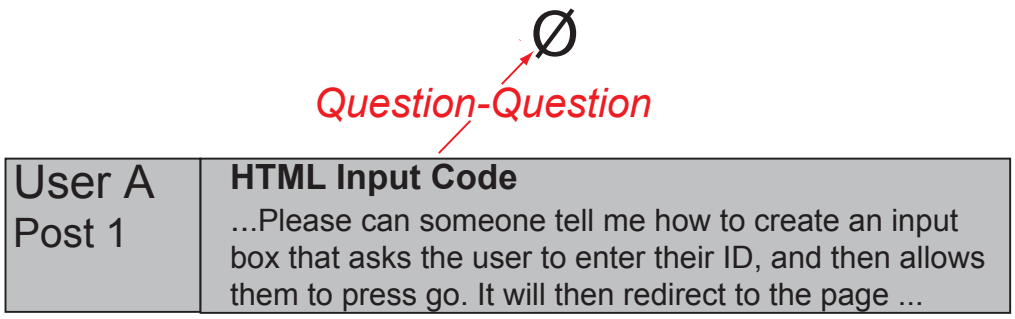
Discourse Structure of Forum Threads



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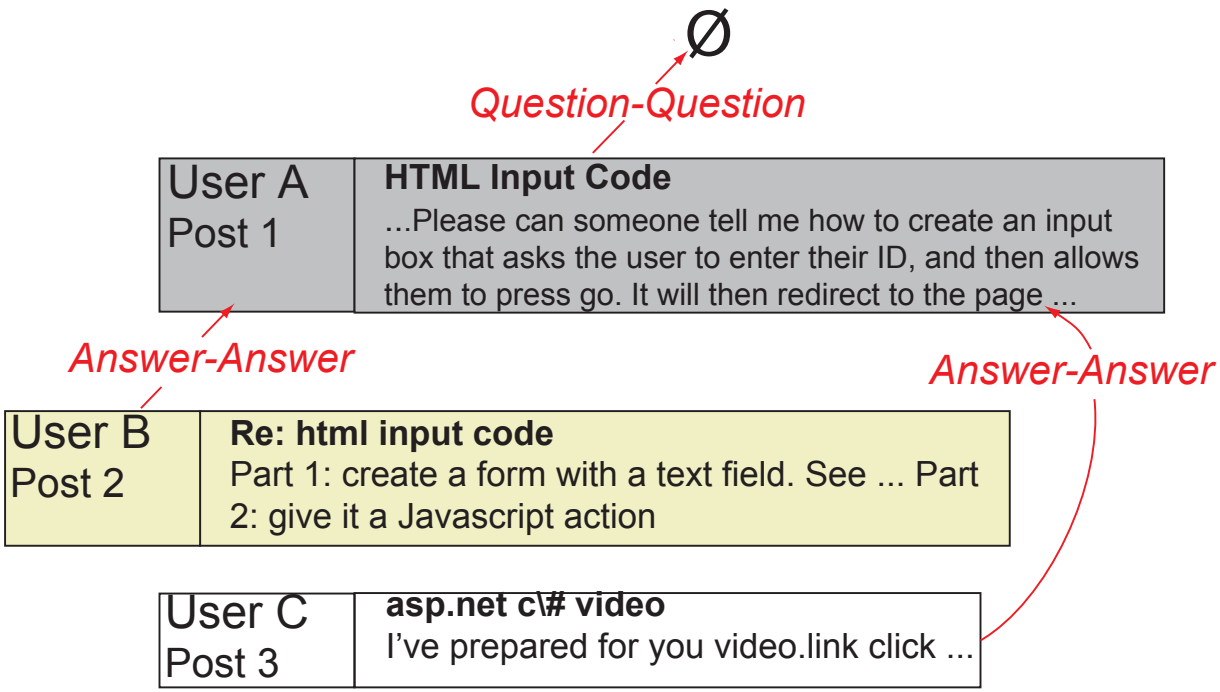

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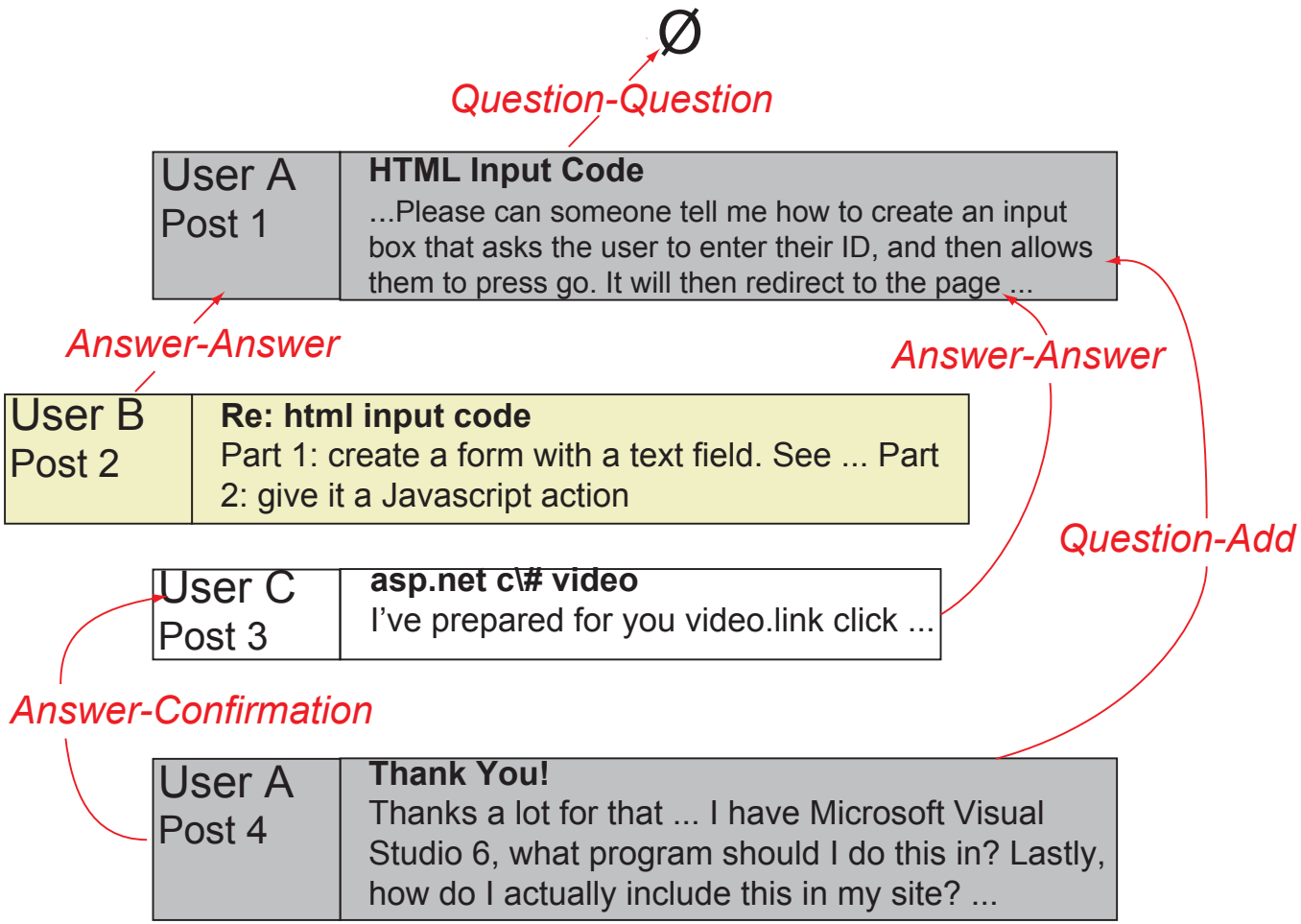

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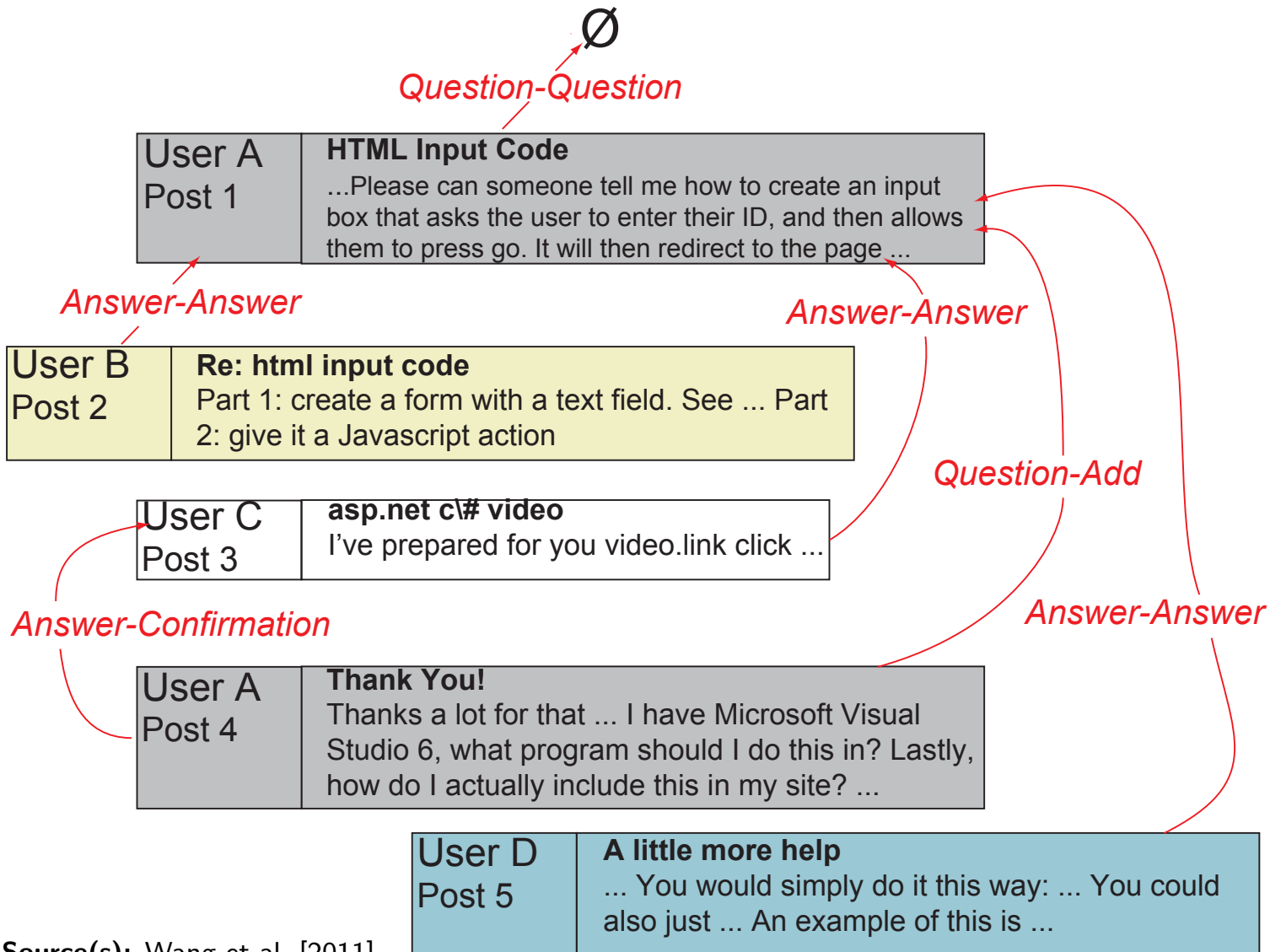

Source(s): Wang et al. [2011]

Dataset

- From Kim et al. [2010], 1332 posts spanning 315 threads from CNET
- Each post is labelled with one or more links, each link is labelled with a dialogue act
  - Question
    - Question, Add, Correction, Confirmation
  - Answer
    - Answer, Add, Objection, Confirmation
  - Resolution
  - Reproduction
  - Other

Methodology

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3. Apply the trained classifier to test data threads

Features

- Structural features:
  - **Initiator:** binary feature indicating whether the current post's author is the thread initiator
  - **Position:** relative position of the current post
- Semantic features:
  - **TitSim:** relative location of the post which has the most similar title to the current post.
  - **PostSim:** relative location of the post which has the most similar content to the current post.
  - **Punct:** number of question marks (QusCount), exclamation marks (ExcCount) and URLs (UrlCount) in the current post.
  - **UserProf:** class distribution of the current post's author

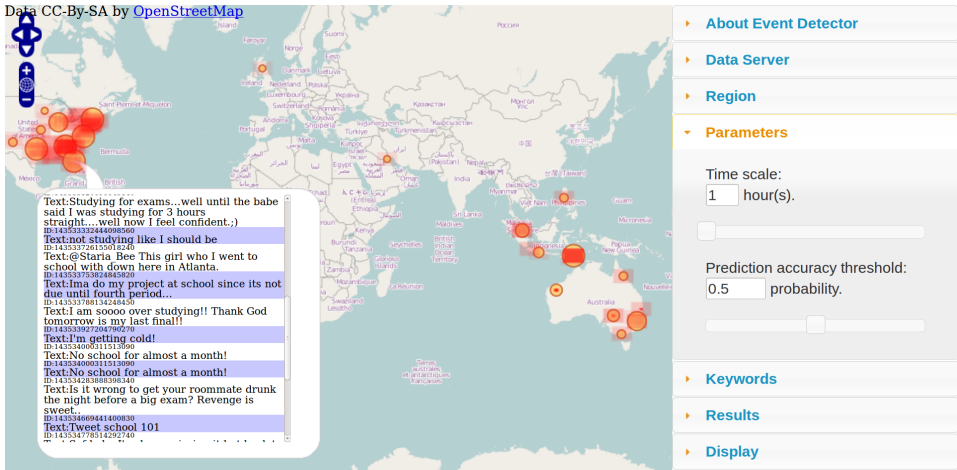
Findings/Bragfest

- State-of-the-art results for discourse parsing task
- More importantly, results to suggest that discourse parsing enhances thread classification (solvedness task)
- **Resources:** labelled dataset with data from a range of forums (CNET, ancestry.com, LinuxQuestions)

Talk Outline

Other Bits and Pieces

- Diachronic analysis of emerging trends in Twitter data stream
- Platform for surveillance of Twitter feed (incorporating LangID, lexical normalisation and geolocation prediction)



Source(s): Baldwin et al. [2012]

Recapping ...

- Social media is hip ... but also big and hairy, and poses both challenges and opportunities for language technology
- Ongoing work on a myriad of technologies/tasks relating to social media, with a growing list of partners
- Watch this space for more!

References I

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