Crowdsourcing Social Media Corpora

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Why Annotate New Social Media Corpora?

- Plenty of already annotated corpora in the news and similar genres
- Big enough for both training and evaluation
- Social media corpora annotated for many NLP tasks are unfortunately largely lacking or too small in comparison to their news counterparts
- We will look into how best to create these in an affordable manner

- LREC 2014 paper: "Corpus Annotation through Crowdsourcing: Towards Best Practice Guidelines" Sabou, Bontcheva, Derczynski, Scharl

The Science of Corpus Annotation

- Quite well understood best practice in how to create linguistic annotation of consistently high quality by employing, training, and managing groups of linguistic and/or domain experts
- Necessary in order to ensure reusability and repeatability of results
- The acquired corpora are of very high quality
- Costs are unfortunately also very high: estimated at between $0.36 and $1.0 (Zaidan and Callison-Burch, 2011; Poesio et al., 2012)

What is Crowdsourcing?

- Crowdsourcing is an emerging collaborative approach for acquiring annotated corpora and a wide range of other linguistic resources
- Three main kinds of crowdsourcing platforms
  - paid-for marketplaces such as Amazon Mechanical Turk (AMT) and CrowdFlower (CF)
  - games with a purpose
  - volunteer-based platforms such as crowdcrafting

Why Crowdsourcing?

- Paid for crowdsourcing can be 33% cheaper than in-house employees when applied to tasks such as tagging and classification (Hoffmann, 2009)
- Games with a purpose can be even cheaper in the long run, since the players are not paid.
- However cost of implementing a game can be higher than AMT/CF costs for smaller projects (Poesio et al, 2012)
- Tap into the large number of contributors/players available across the globe, through the internet
- Easy to reach native speakers in various languages (but beware Google translate cheaters!)

Genre 1: Mechanised Labour

- Participants (workers) paid a small amount of money to complete easy tasks (HIT = Human Intelligence Task)

amazon mechanical turk™
Artificial Artificial Intelligence

CrowdFlower

Paid for Crowdsourcing

- Contributors are extrinsically motivated through economic incentives
- Carry out micro-tasks in return for micro-payments
- Most NLP projects use crowdsourcing marketplaces: Amazon Mechanical Tutk and CrowdFlower
- Requesters post Human Intelligence Tasks (HITs) to a large population of micro-workers (Callison-Burch and Dredze, 2010a)
- Snow et al. (2008) collect event and affect annotations, while Lawson et al. (2010) and Finin et al. (2010) annotate special types of texts such as emails and Twitter feeds, respectively.
- Challenges:
  - low quality output due to the workers' purely economic motivation
  - high costs for large tasks (Parent and Eskenazi, 2011)
  - ethical issues (Fort et al., 2011)

Genre 2: Games with a purpose (GWAPs)

facebook Friends Applications Inbox Home Search

US08 Sentiment Quiz
Play Rankings Awards Feedback Help About

Sentiment Quiz Award

ECOresearch.net

Is the following a negative, neutral or positive statement about the candidate?

"We are headed down a path that is certain to end in the destruction of our experiment in democracy."

September 2008
843 players See All

1.	Fiorella	2458
2.	Michel	221
3.	Birgit	2139
4.	Rose	1011
5.	Herti	930
...		
11.	Arno	101
12.	Guilherme	77
13.	You	65
14.	Lisa	61

Others currently playing

Status

4 Level

1514 13 12

65

Your current score is **65 points**. Invite your friends and earn 10% of the points they make!

Election Monitor
Vote for your favorite candidate!

Barack Obama John McCain Cynthia McKinney

Spread the Word

Tell your Friends!

You will earn **10% of your friends' points** after they accept your invitation! The calculation is recursive, so if they invite others you will even get more bonus points.

New Media MBA
www.modul.ac.at/nmt/mba

EDITED BOOK
The Geospatial Web
Geobrowsers, Social Software & the Web 2.0

Page built by Sentiment Quiz (report)

About Find Friends Advertising Developers Terms Privacy Help

wordrobe
play what you mean

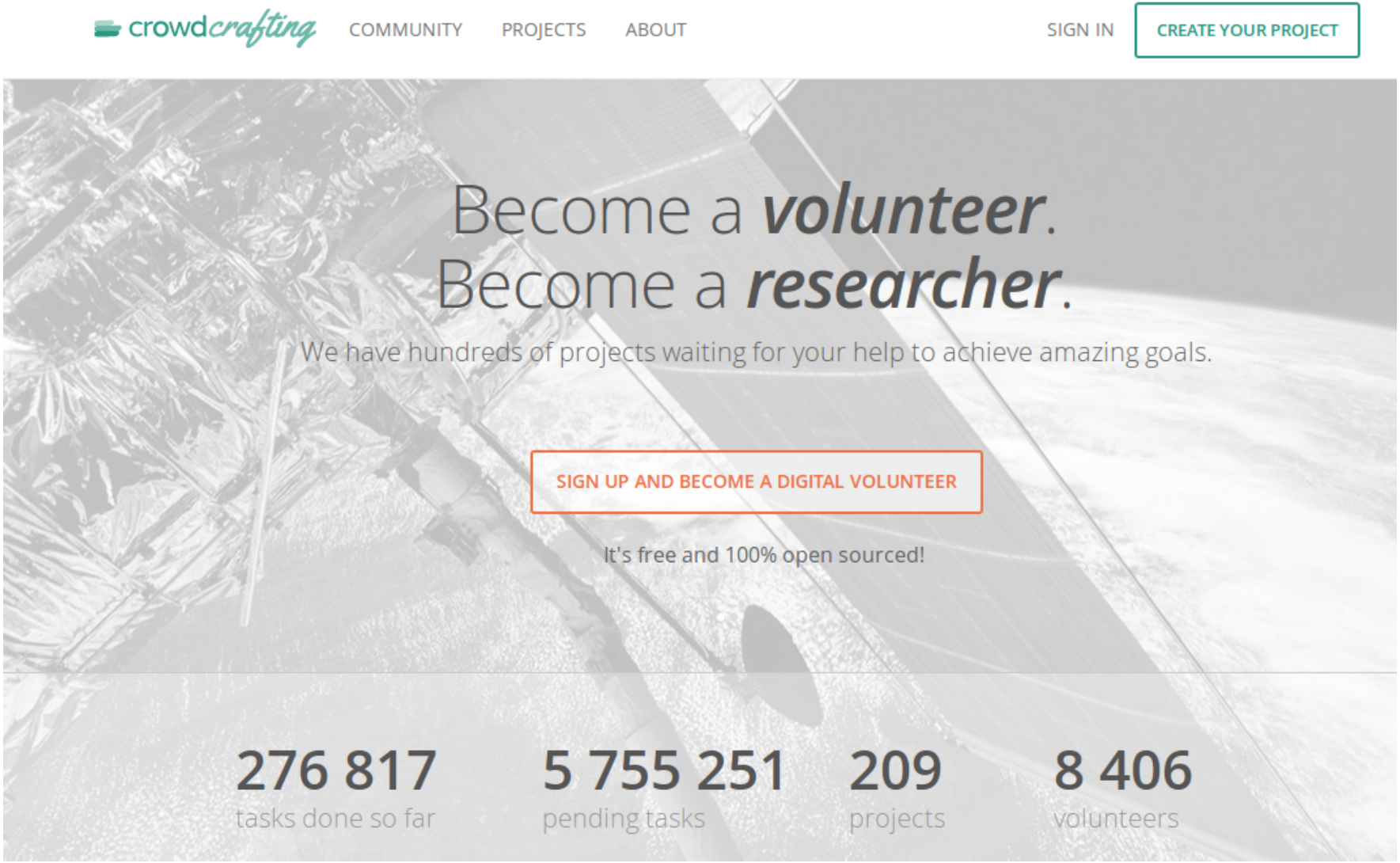
Ranking (last 50 days)

1	Valerio	32150 points
2	wordrobe	5363 points
3	Aristotle	3998 points
4	sebb	3266 points
5	vincent	3028 points
6	arjanb	2495 points
7	EvaVanmassenhove	1308 points
8	furryfreak	1038 points

Games with a Purpose (GWAPs)

- In GWAPs (von Ahn and Dabbish, 2008), contributors carry out annotation tasks as a side effect of playing a game
- Compared to paid-for marketplaces, GWAPs:
  - reduce costs and the incentive to cheat as players are intrinsically motivated
  - promise superior results, due to motivated players and better utilization of sporadic, explorer-type users (Parent and Eskenazi, 2011)
- Example GWAPs:
  - Phratris for annotating syntactic dependencies (Attardi, 2010)
  - PhraseDetectives (Poesio et al.,2012) to acquire anaphora annotations
  - Sentiment Quiz (Scharl et al., 2012) to annotate sentiment
  - http://www.wordrobe.org/ - A collection of NLP games incl. POS, NE
- Challenges:
  - Designing pealing games and attracting a critical mass of players are among the key success factors within this genre (Wang et al., 2012)

Genre 3: Altruistic Crowdsourcing



Workflow for Crowdsourcing Corpora

GATE

1a. Select NLP Problem and crowdsourcing genre
1b. Decompose NLP problem into tasks
1c. Design crowdsourcing task

1. Project Definition

2a. Collect and pre-process corpus
2b. Build or resuse annotator and management interfaces
2c. Run pilot studies

2. Data and UI Preparation

3a. Recruit and screen contributors
3b. Train, profile and retain contributors
3c. Manage and monitor crowdsourcing tasks

3. Running the Project

4a. Evaluate and aggregate annotations
4b. Evaluate overall corpus characteristics

4. Corpus Delivery

Step 1. Project Definition

- Data distribution: how “micro” is each microtask?
  - Long paragraphs hard to digest, worker fatigue
  - Single sentences not always appropriate: e.g. for co-ref
- Reward scheme
  - Granularity – per task? Per set of tasks? High scores?
  - What to do with “bad” work
  - How much to reward
    - No clear, repeatable results for quality:reward relation
    - High rewards get it done faster, but not better
    - Pilot task gives timings, so pay at least minimum wage

Step 1. Project Definition

- Choose the most appropriate genre or mixture of crowdsourcing genres
  - Trade-offs: Cost; Timescale; Worker skills

- Pilot the the design, measure performance, try again
  - Simple, clear design important
  - Binary decision tasks get good results

Step 1. Project Definition

- Named entity recognition example:
  - Entity selection options
    - Allow users to select entities with the mouse
    - Ask users to click on the words which constitute the entity
    - Show users a highlighted entity in context and ask them to classify its type
  - Task definition options
    - Ask users to classify entities into 4-7 pre-defined classes simultaneously
    - Focus on one entity class only, e.g. locations, and ask users to mark only these
  - Distinguish tweets with no entities from tweets where user has not marked anything

Step 2: Data and UI Preparation

- Pre-process the corpus linguistically, as needed, e.g.
  - Tokenise text if user needs to select words
  - Identify proper names/noun phrases if we want to classify these
  - Bring additional context, if needed, e.g. text of user profile from Twitter
- Build and test the user interfaces
  - Easy to medium difficulty in AMT/CF and crowdcrafting
  - Medium to hard for GWAPs
- Run bigger pilot studies with volunteers to test everything and collect gold units for quality control later

Step 2: Data and UI Preparation

Job 444445
Finished

1. DESIGN JOB
- Data
- Build Job
- Preview

2. MANAGE QUALITY
- Test Questions
- Contributors
- Job Settings

3. GET RESULTS
- Launch
- Monitor
- Results

Contact us!

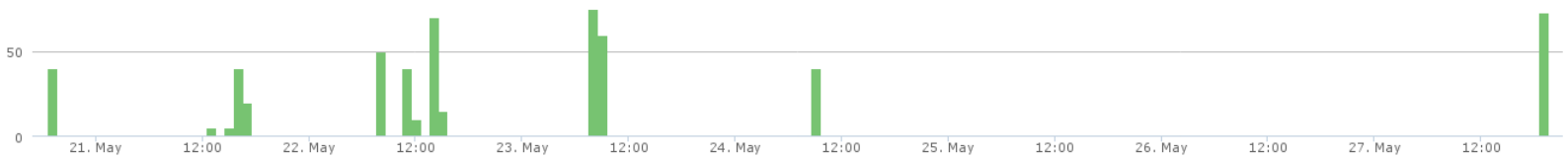
Disambiguating entities in tweets

Dr K Boncheva

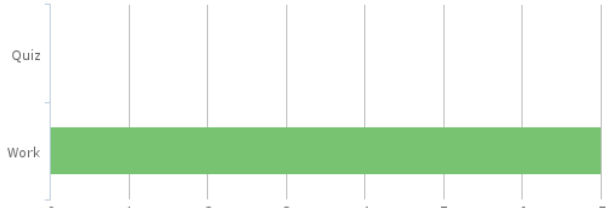
Dashboard | Advanced Analytics

100% Complete	0 Active Test Questions	291 Units	
3 Judgments Per Hour	873 Trusted Judgments	0 Untrusted Judgments	0 Pending Judgments

Judgments Per Hour — Estimated Completion: May 28, 10:31 am



Contributor Funnel



Test Questions

No test questions found.

Contributor Satisfaction

3.3 / 5 Overall

3.7 / 5 Instructions Clear

3.3 / 5 Test Questions Fair

3.3 / 5 Ease Of Job

3 / 5 Pay

Step 3: Running the Crowdsourcing Project

- Can run for hours, days or years, depending on genre and size
- Task workflow and management
  - Create/verify workflows where challenging NLP tasks are decomposed into simpler ones. Where disagreement exists, the task is sent to be verified by another set of annotators
  - E.g., if "Manchester" is marked as a location by some contributors and as referring to an organisation by others (e.g. Manchester United FC), then show the 2 alternatives to new contributors asking them which is correct in the given context
- Contributor management (including profiling and retention)
  - Recruit volunteers (e.g. restrict by country/spoken language, advertise in media)
  - Test their knowledge, if needed
  - Have sufficient number of contributors
    - Lawson et al. (2010): number of required labels varies for different aspects of the same NLP problem. Good results with only four annotators for Person NEs, but require six for Location and seven for Organizations
- Quality control
  - Use gold units to control quality

Step 3: Running the Crowdsourcing Project

- Multi-batch methodology
  - Submit tasks in multiple batches
  - Restrictions by country/language
  - Contributor diversity by starting batches at different times
  - Needs less gold data

Step 4: Evaluation and Corpus Delivery

- Evaluate and aggregate contributor inputs to produce final decision
  - Majority vote
  - Discard inputs from low-trusted contributors (e.g. Hsueh et al. (2009))
  - MACE: a) identify which annotators are trustworthy and b) predict the correct underlying labels (Hovy 2013)
- Merge individual units from the microtasks (e.g. sentences) into complete documents, including all crowdsourced markup
- Tune the expert-created "gold" standard based on annotator feedback
  - Gold standard test questions often contain ambiguities and errors

Contributor 21271141: "GWTDT - Girl With The Dragon Tattoo is a film, therefore a product as it was made for sale." (0 Votes)

    These are a great opportunity to train workers and amend expert data
  - Better gold data means better output quality, for the same cost
- To facilitate reuse, deliver the corpus in a widely used format, such as XCES, CONLL, GATE XML

Legal and Ethical Issues

1. Acknowledging the Crowd‘s contribution

   S. Cooper, [other authors], and **Foldit players**: Predicting protein structures with a multiplayer online game. Nature, 466(7307):756-760, 2010.

2. Ensuring privacy and wellbeing
   1. Mechnised labour criticised for low wages, lack of worker rights
   2. Majority of workers rely on microtasks as main income source
   3. Prevent prolonged use & user exploitation (e.g. daily caps)

3. Licensing and consent
   1. Some clearly state the use of Creative Common licenses
   2. General failure to provide informed consent information

Example: CF Instructions

Finding location names in text

Instructions ▲

In each sentence below, mark any names that are locations (e.g. **France**). Don't mark locations that don't have their own name.

There may be no locations in the sentence at all - that's OK.

Examples:

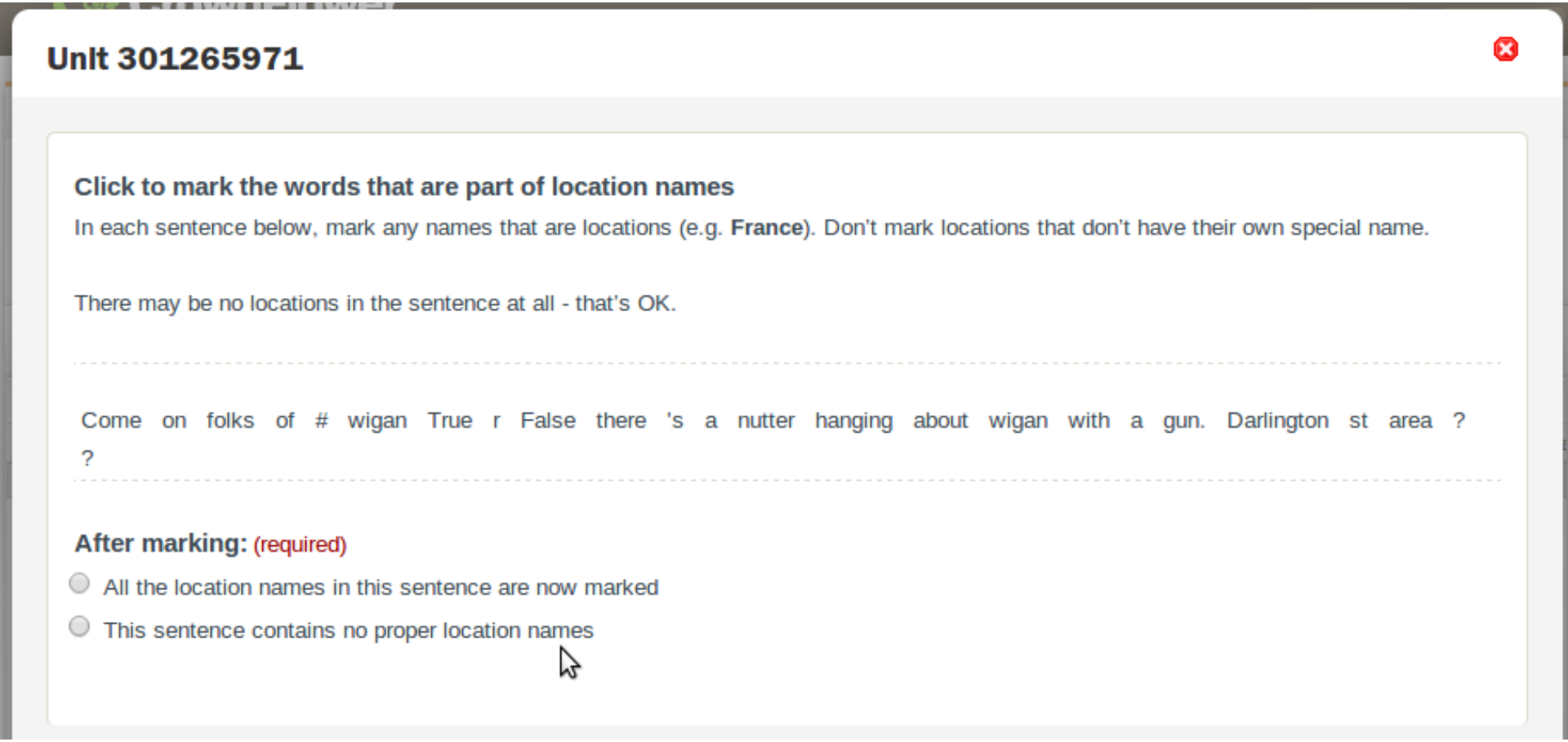
"There was a celebration in **London**"
correct - London is a location name

"The **room** is empty"
wrong, because room isn't the name of a particular location

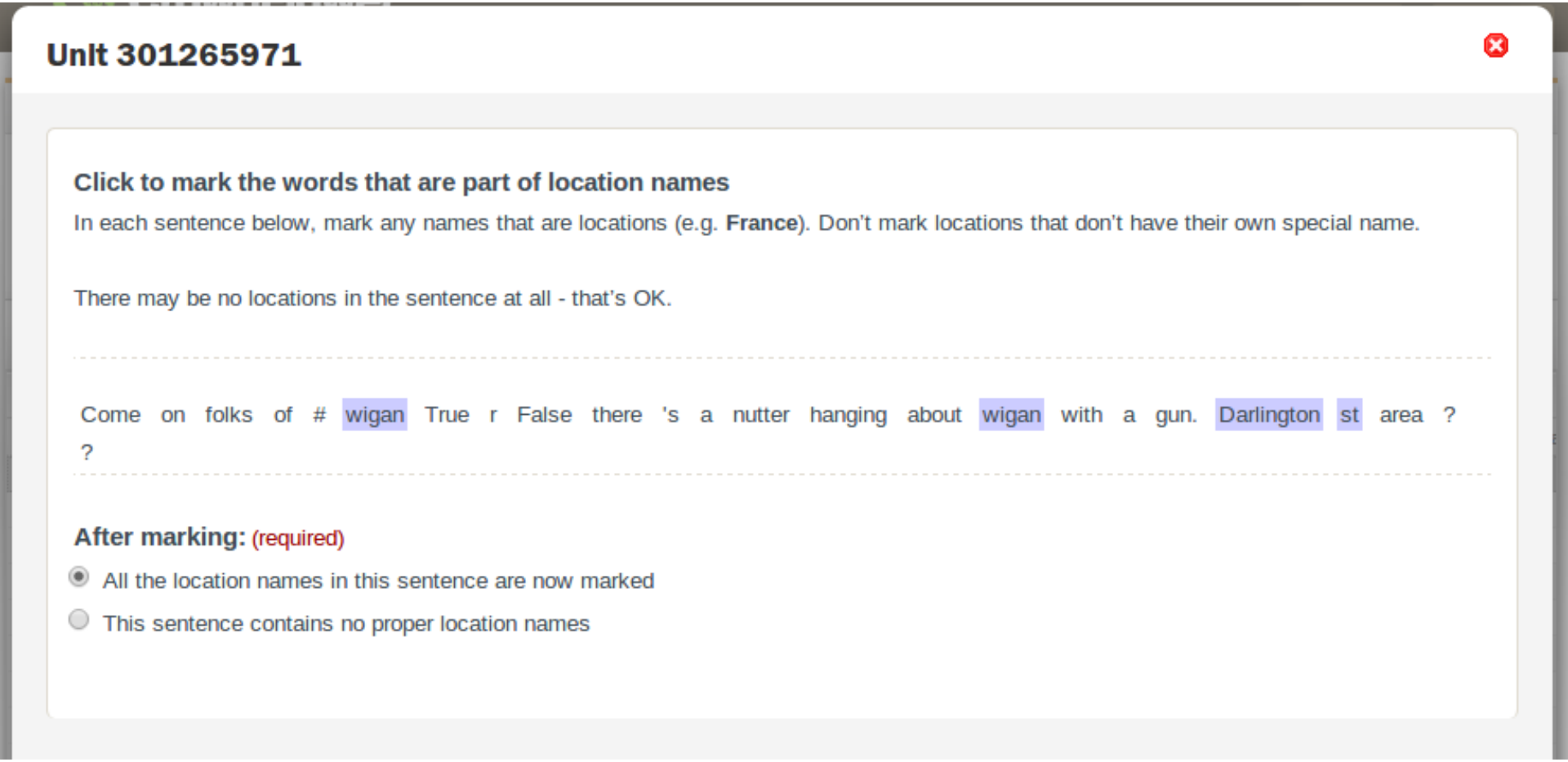
"We traveled to **Spain** and had a great time **there**"
Only mark the location names, not words that just refer to it

"The award went to **Chelsea** Clinton"
wrong, because here Chelsea is a person

Example: CF Marking Locations in tweets



Example: CF Locations selected



Example 2: Entity Linking Annotation in CF

Work mode 11 tasks completed 1 cents per task

Give up Help 0 Suman Aswani

Entity Disambiguation Task

29:19 left for this task

Instructions

Exclusive : Rep . Steve King on ObamaCare , Tea Party , and Constitution Day : The inclusion of the Tenth Amendment in ... http://bit.ly/cYITA8

URLs in the tweet:

http://bit.ly/cYITA8

Which of the descriptions below describes "Steve King" best?

- Steven Arnold Steve King (born May 28, 1949) is the U.S. Representative for Iowa's 5th congressional district, serving since 2003. He is a member of the Republican Party. The district is located in the western part of the state and includes Sioux City and Council Bluffs. .
- Steve King is a legislator in the U.S. state of Colorado. Elected to the Colorado House of Representatives as a Republican in 2006, King represents House District 54, encompassing southern Mesa County and western Delta County, Colorado. .
- For other people named Steve King, see Stephen King (disambiguation). Template:Infobox gridiron football person George Stephen King (born June 10, 1951) is a former American football linebacker in the National Football League. He graduated from Quinton high school in Quinton, Oklahoma in 1969. He then played for The University of Tulsa. He also played nine seasons for the New England Patriots. .
- Stephen F. King (1842-1895) was an American professional baseball player who played in the National Association as an outfielder for the 1871-1872 Troy Haymakers. .
- None of the above
- Not an Entity
- Cannot decide

How to do it: The Laborious Way

- Export linguistic data as CSV file and load up into CrowdFlower
- Create instructions as HTML
- Customise the annotation UI (e.g. we had to use JavaScript for NE selection)
- Select how many judgments per micro-task and any restrictions on the annotators (e.g. country of origin)
- Test it and revisit any of the above, as needed
- Launch it and collect the data
- Download the results and put together the corpus
- Adjudicate

How to do it: The Easy Way

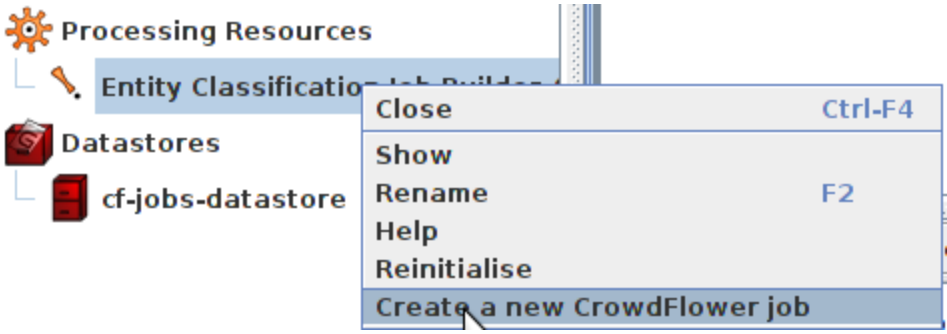
- Use the GATE Crowdsourcing plugin (release 8 onwards)
  - https://gate.ac.uk/wiki/crowdsourcing.html
- Transforms automatically texts with GATE annotations into CF jobs
- Generates the CF User Interface (based on templates)
- Researcher then checks and runs the project in CF
- On completion, the plugin imports automatically the results back into GATE, aligning to sentences and representing the multiple annotators
- To use, from the Plugin manager, load the Crowd_Sourcing plugin

Crowd_Sourcing Plugin: Terminology

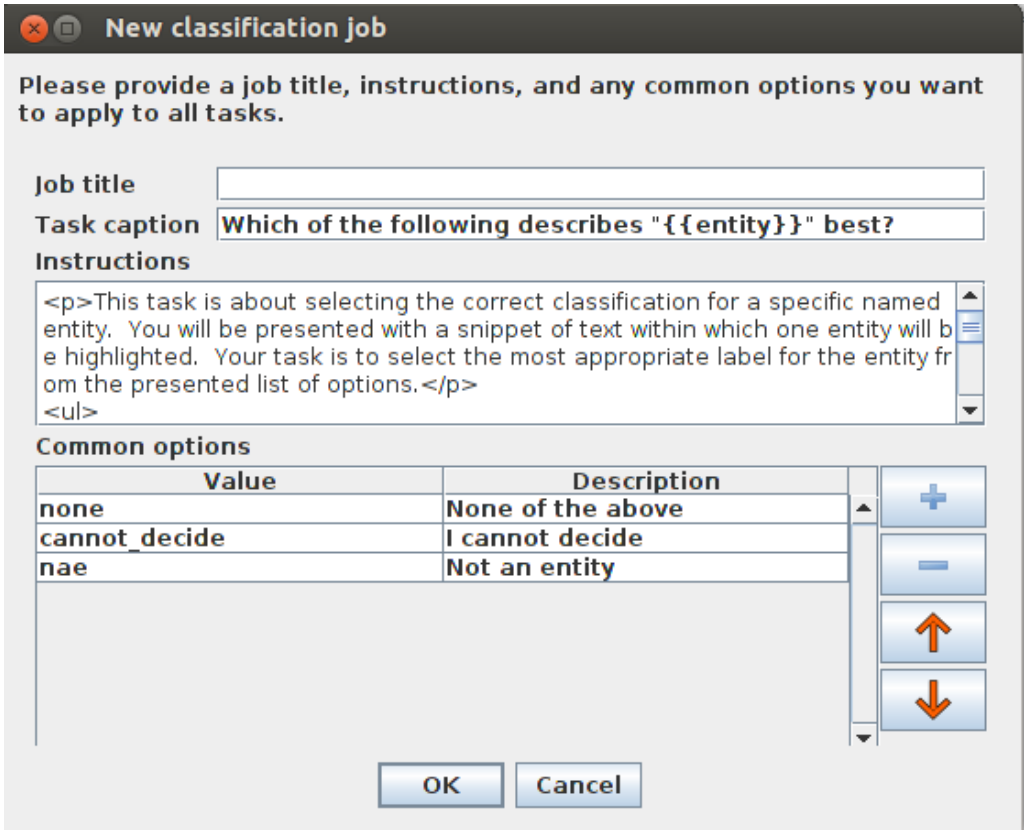
- *A job* - a single end-to-end crowdsourcing process. Holds a number of units of work
- *A unit* - single item of work. CrowdFlower presents several units at a time to the user as a single task, and users are paid for each task they successfully complete
- *A gold unit* - the correct answer is known in advance.
    - When a job includes gold units, CrowdFlower includes one gold unit in each task but does not tell the user which one it is, and if they get the gold unit wrong then the whole task is discarded.
    - You can track users' performance through the CrowdFlower platform and ignore results from users who get too many gold units wrong.

GATE Crowdsourcing Overview (1)

- Choose a job builder
  - Classification
  - Annotation
    (Sequence Selection)

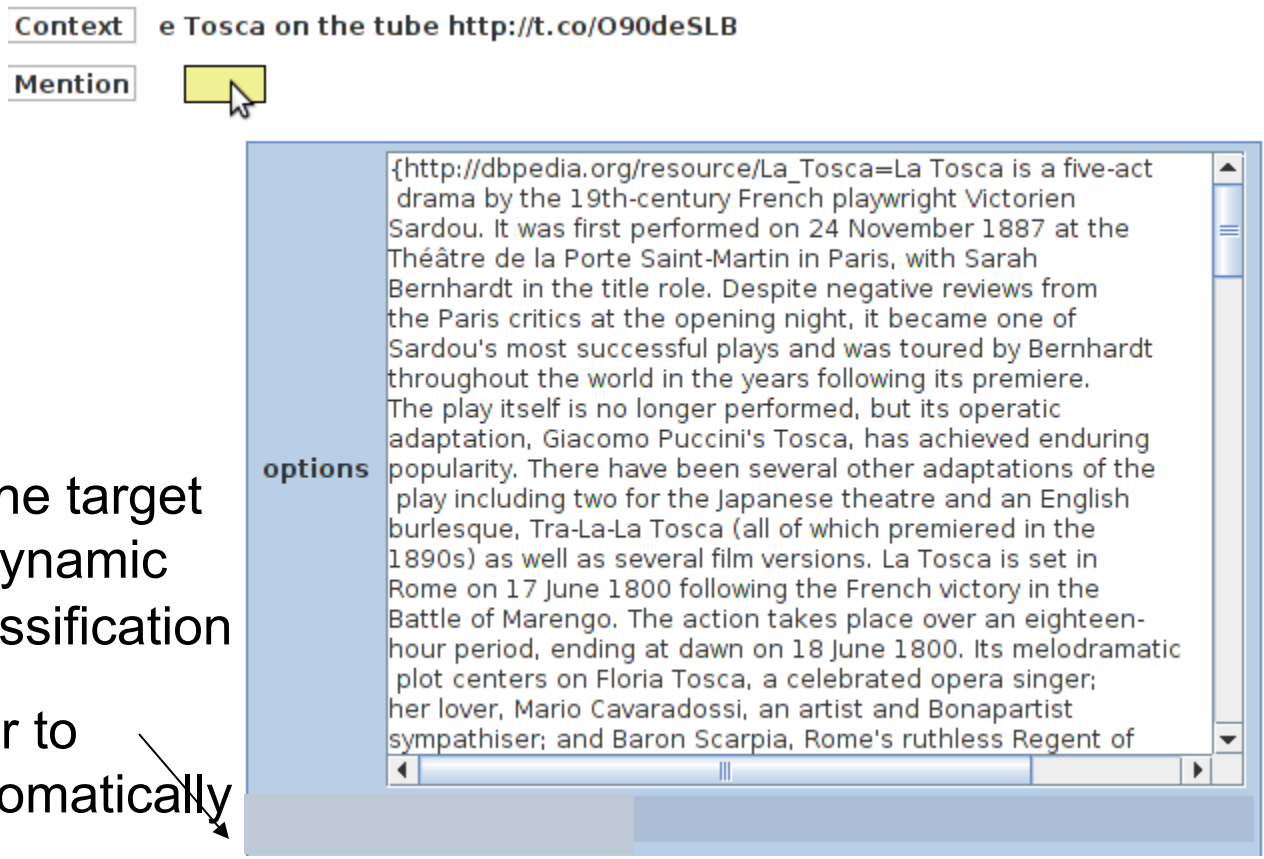


- Configure the corresponding user interface and provide the task instructions



GATE Crowdsourcing Overview (2)

- Pre-process the corpus with TwitIE/ANNIE, e.g.
  - Tokenisation
  - POS tagging
  - Sentence splitting
  - NE recognition
- Save to a datastore
- Create automatically the target annotations and any dynamic values required for classification
- Execute the job builder to upload units to CF automatically



GATE Crowdsourcing Overview (3)

GATE Developer 7.2-SNAPSHOT build 4739

File Options Tools Help

- GATE
  - Applications
    - Corpus Pipeline_00031
  - Language Resources
    - 100-nel-tweets-ner-a-set
  - Processing Resources
    - Entity Classification Job Builder_(
  - Datastores
    - cf-jobs-datastore

Resource Features

Messages | cf-jobs-datasto... | 100-nel-tweets-... | Corpus Pipeline...

Loaded Processing resources

Name

Selected Processing resources

!	Name	
●	Entity Classification Job Builder_00041	Entity Classi

Type: Entity Classification Job Builder

Corpus: 100-nel-tweets-ner-a-set

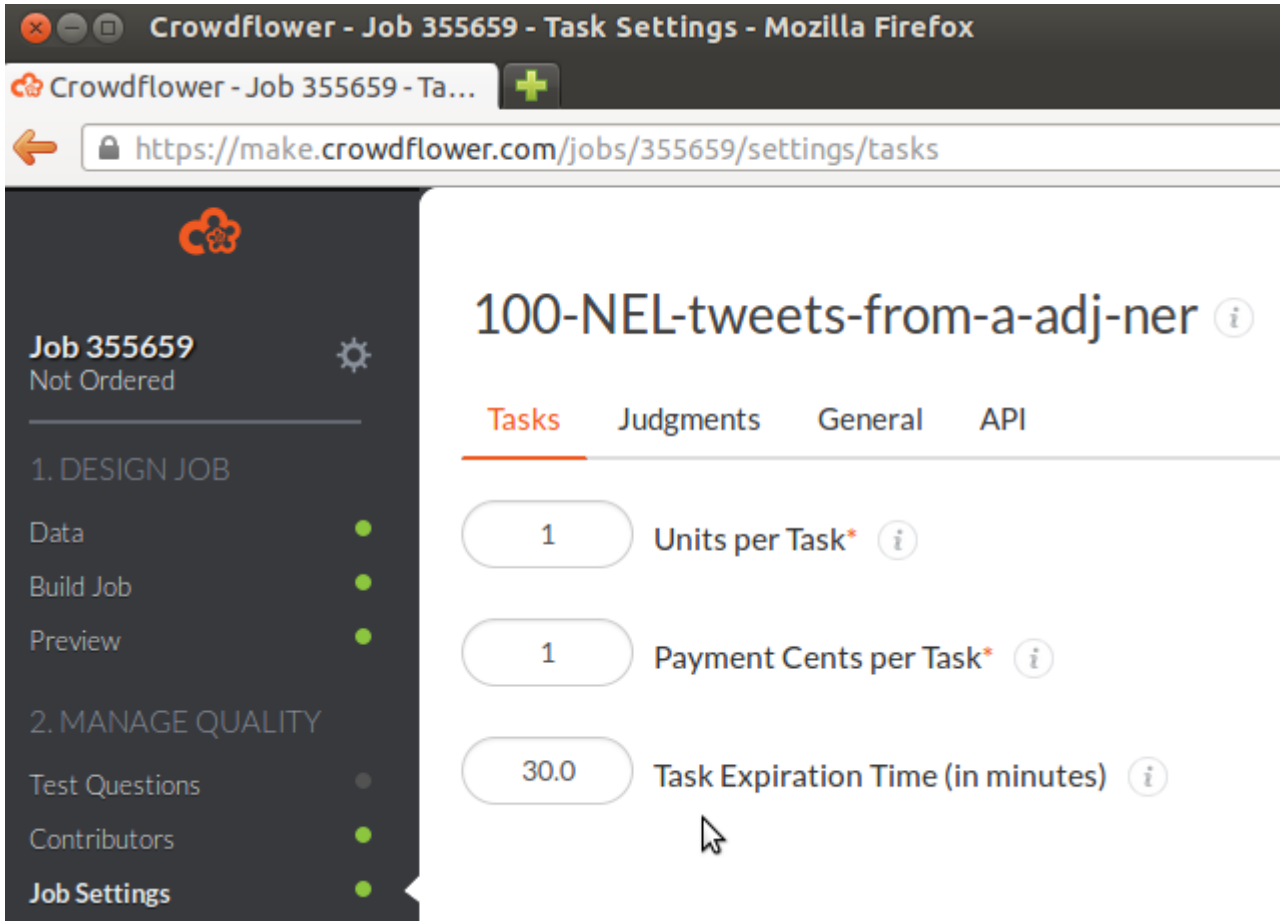
Runtime Parameters for the "Entity Classification Job Builder_00041" Entity Classification Job Builder:

Name	Type	Required	
contextASName	String		
contextAnnotationType	String	✓	Sentence
entityASName	String		
entityAnnotationType	String	✓	Mention
jobId	Long	✓	355659

Run this Application

Serial Application Editor | Initialisation Parameters

Configure and execute the job in CF



Gold data units can also be uploaded from GATE, so CF controls quality

CF Job Overview

Crowdflower - Job 355659 - Dashboard - Mozilla Firefox

Crowdflower - Job 355659 - Da...

https://make.crowdflower.com/jobs/355659/dashboard

CAPS info day

Job 355659
Not Ordered

1. DESIGN JOB
- Data
- Build Job
- Preview

2. MANAGE QUALITY
- Test Questions
- Contributors
- Job Settings

3. GET RESULTS
- Launch
- Monitor
- Results

Contact us!

100-NEL-tweets-from-a-adj-ner

Ian Roberts

Dashboard | Advanced Analytics

0%	0	219	
Complete	Active Test Questions	Units	
0	0	0	0
Judgments Per Hour	Trusted Judgments	Untrusted Judgments	Pending Judgments

Judgments Per Hour — Estimated Completion: **Unknown**

Contributor Funnel	Test Questions	Contributor Satisfaction
No contributors found.	No test questions found.	No contributors have taken the survey.

Hands On: Classify named entities in CF

- Open http://tinyurl.com/gateannotate
- Login to CrowdFlower, as required
- Read the instructions and spend a few minutes annotating
- Make a note of any questions/issues you encounter
- Let's discuss them

Home work: Create a tweet classification CF job

- The aim is to crowdsource whether a set of tweets have positive/ negative/neutral sentiment (i.e. classification job)
- Register with CrowdFlower for an API key
- Unpack hands-on-crowdsourcing.zip
- Load Datastore (sample-classification-ds) from within the hands-on
- Load the corpus from that datastore in GATE Developer
- Create an Entity Classification Job builder and give it your API key
- Right click on the Job builder/Create New CrowdFlower job
- Give it a job title, modify task captions and instructions to explain the sentiment classification task, and change the categories accordingly (pos/neg). You may keep none and cannot decide or remove them. Make sure the newly added classes are saved properly in the dialogue box

Home work (2)

- Add the Job builder PR to a new corpus pipeline
- Since we are classifying the entire tweets as pos/neg/neutral, specify text as the annotation type for both contextAnnotationType and entityAnnotationType (it is in the default set, so leave those blank)
- Set the skipExisting parameter to **false**
- Run the application
- Login to CrowdFlower, check and launch the job
- Set the channels to internal only
- See the bottom of the “Monitor” page for a sharable link.

Home work (3) – the job UI created

@Lobster JZombie I will survive global warming/climate change. #Evolution

Please indicate the sentiment expressed in this short text

- ○ Neutral/No sentiment
- ○ Positive sentiment
- ○ Negative sentiment
- ○ None of the above
- ○ I cannot decide

Comment

Importing CrowdFlower results into GATE

- Make sure the job is completed in CrowdFlower
- Load an Entity Classification or an Entity Annotation Results Importer, depending on what job you have created initially
- Add it to a corpus pipeline
- Provide the correct job ID by copying it from CrowdFlower
- Make sure the entityAnnotationType parameter has the correct value. For the tweet sentiment classification, for example, this would need to be changed to text
- Run the pipeline – it will iterate through the annotations and import the CF judgements automatically
- The results will be in the crowdResults set (unless you renamed it in the importer PR)

Importing CrowdFlower results (2)

Loaded Processing resources

Name

Selected Processing resources

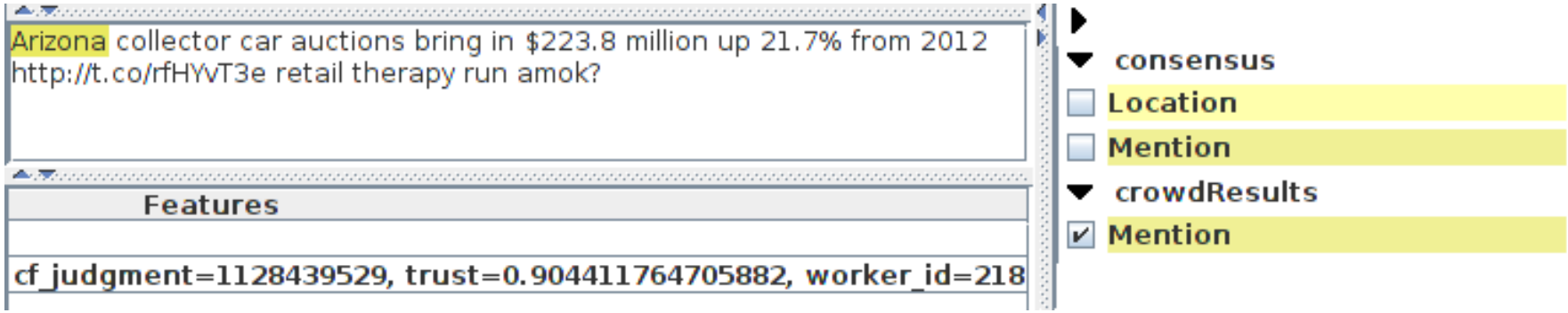
!	Name	
●	Entity Classification Results Importer_00...	Entity

Corpus: <none>

Runtime Parameters for the "Entity Classification Results Importer_0000E" Entity Classification Results Importer:

Name	Type	Required	Value
entityASName	String		
entityAnnotationType	String	✓	Mention
jobId	Long	✓	458103
resultASName	String		crowdResults
resultAnnotationType	String	✓	Mention

Automatic CF Import into GATE



- Each CF judgement is imported back as a separate annotation with some metadata
- Adjudication can happen automatically (e.g. write a JAPE file to calculate majority vote) or manually (Annotation Stack editor)
- The resulting corpus is ready to use for experiments or can be exported out of GATE as XML/XCES

Manual adjudication: Annotation Stack

- Double click on each document, to view it
- Press the Annotations Stack button to show the editor
- Select Mention (or your target classification annotation type) in the crowdResults Annotation Set
- All judgements will be shown one underneath the other
- Press Previous/Next boundary buttons to navigate

Manual adjudication: Example

Previous boundary | Next boundary | Overlapping | Target set: Undefined

Context | Overheard: Hot Money's Hurried Exit from

crowdResults#Mention

answer	nae
cf_judgment	1161476185
trust	0.792307692307692
worker_id	21909523

Double-click to copy. Right-click to edit.
Ctr-click to show URL. Ctr-Sh-click to delete.

- Mention
- anniePerSet
- Lookup
- crowdResults
- Mention
- thingsLkb
- Lookup

Previous boundary | Next boundary | Overlapping | Target set: Undefined

Context | Overheard: Hot Money's Hurried Exit from

crowdResults#Mention

answer	http://dbpedia.org/resource/Hot_money
cf_judgment	1131549161
trust	0.792307692307692
worker_id	21878589

Double-click to copy. Right-click to edit.
Ctr-click to show URL. Ctr-Sh-click to delete.

- Mention
- anniePerSet
- Lookup
- crowdResults
- Mention
- thingsLkb
- Lookup

Document Editor | Initialisation Parameters

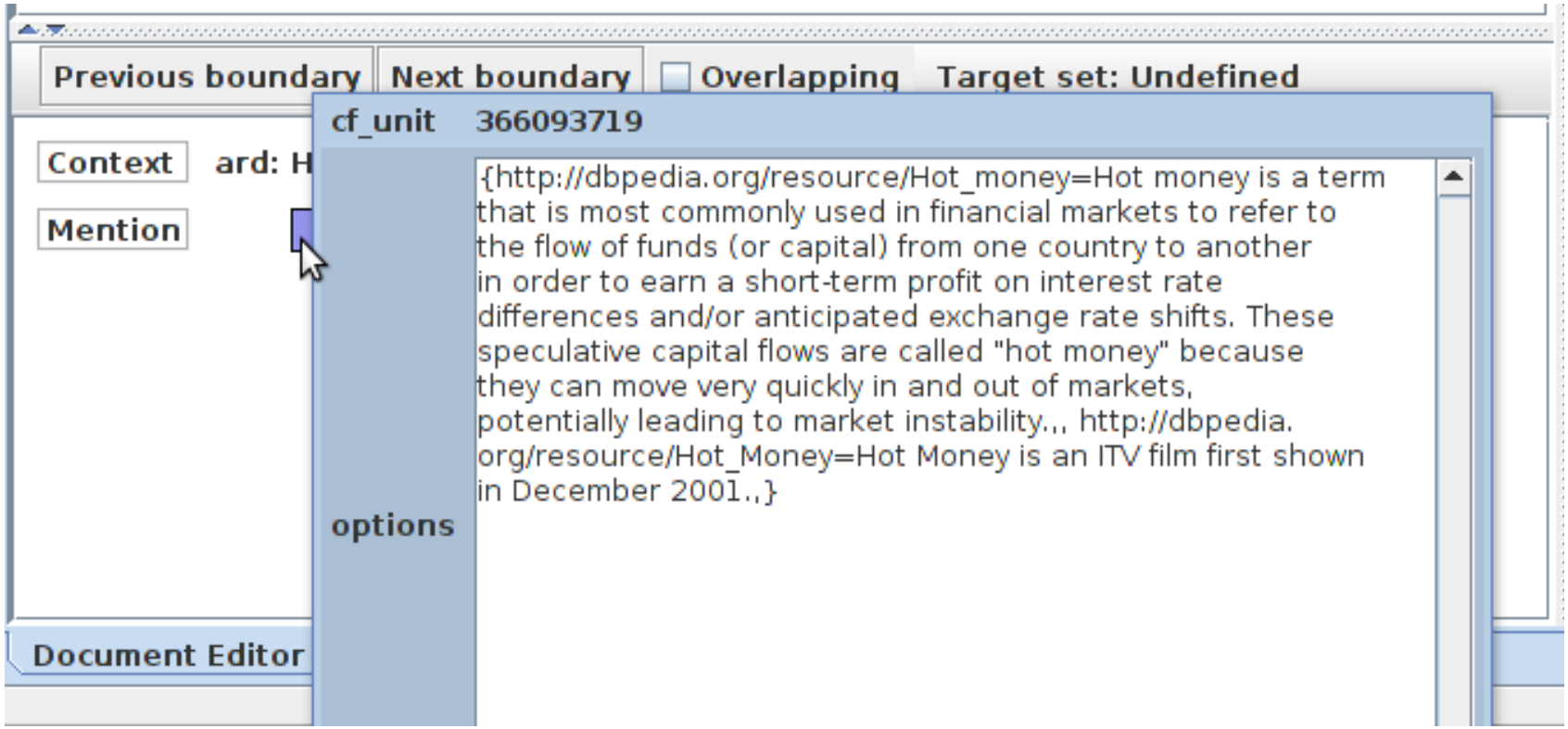
Manual adjudication: Annot. Stack (2)

- To adjudicate, double click on the annotation that you consider correct according to the annotation guidelines.
- This will copy the selected annotation into a new annotation set, together with all its features
- If more than 1 co-extensive annotation is correct, double click on just one of them (e.g. you don't want the gold standard to expect the system to annotate the same NE twice)
- Specify the target annotation set name, e.g. Key or consensus. You only need to do this once, then the same AS is used automatically
- Don't forget to save the document when you are finished

Manual adjudication: Hands on

- The task here is to disambiguate named entities by assigning them DBpedia URIs (values of the inst feature)
- From hands-on-crowdsourcing.zip, unpack the adjudication-exercise directory
- Create a corpus and populate it from that directory (11 docs)
- Double click several of them and try adjudicating the Mention annotations from the crowdResults annotation set
- Store the adjudicated annotations into the Key set
- For Mentions flagged as noe (not-an-entity), if you agree, then do not create a corresponding Mention in the Key set
- To see the choices shown in CF, enable the Annotations Stack to show also the Mention annotations from the default set

Hands on: Questions



- In the last document, do you think Hot Money should be included as an entity with and URI or not?

Automatic Adjudication

- Annotations can also be adjudicated automatically, by “voting” between annotators.
- Use the two Majority-vote consensus builder PRs for this.
- We can set a minimum threshold for agreement
  - For example, refusing to accept an answer on which fewer than two out of three annotators agreed.
- Disputed judgments can then either be classified by hand, or fed back to CrowdFlower as a new job.

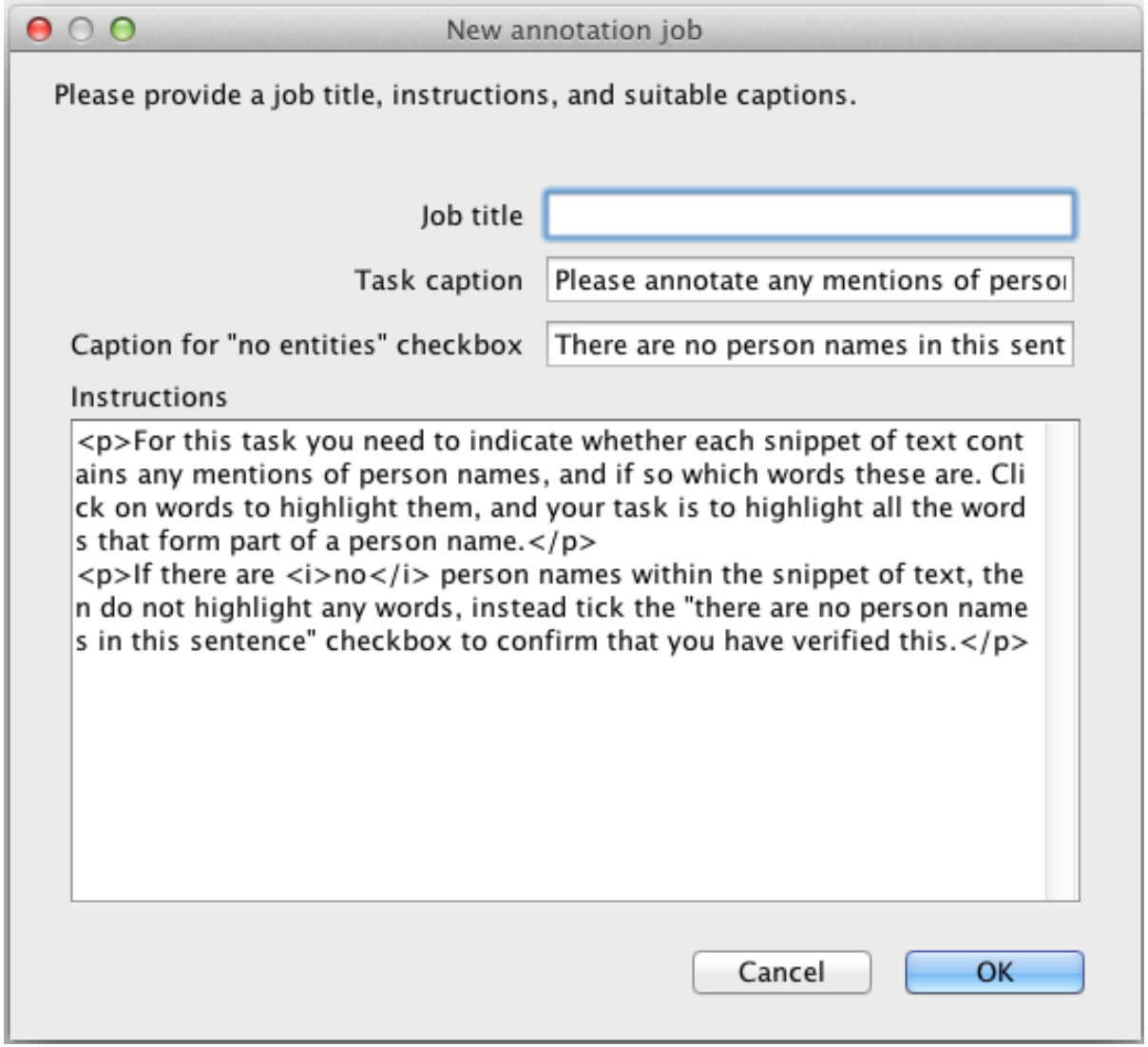
Automatic Adjudication: Hands on

- Use the same corpus as before (from adjudication-exercise directory) but reload it.
- Create a new Majority-vote consensus builder PR (classification) and add to a pipeline.
- Set the minimum agreement to 2 meaning both annotators must agree – keep all other parameters the same.
- Run the pipeline and check the crowdConsensus and crowdDisputed sets.

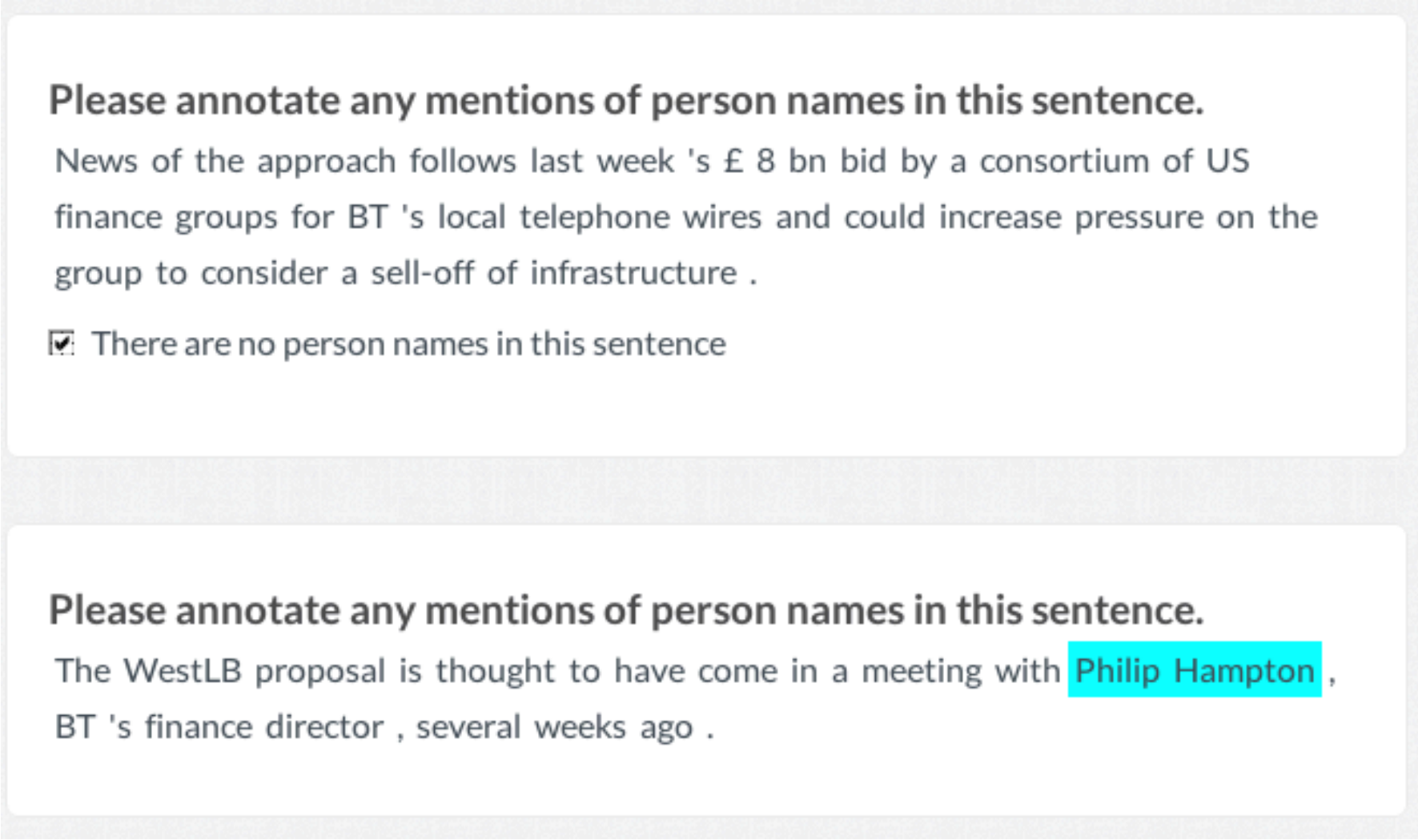
Entity Annotation Jobs

- The “entity annotation” job builder and results importer PRs are for marking occurrences of named entities in plain text (or any sequence of tokens really)
- Assumptions:
  - Text is presented in short snippets (e.g. one sentence).
  - Each job focuses on one entity type. Annotating different entity types is done through running different jobs on the same corpus.
  - Entity annotations are whole tokens only, and there are no adjacent annotations (i.e. a contiguous sequence of marked tokens represents one target annotation)

Entity Annotation Jobs (2)



Entity Annotation Jobs (3)



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