FakeDet: Research on

Detection at

جامعة قطر
QATAR UNIVERSITY

Tamer Elsayed

SocInfo 2019

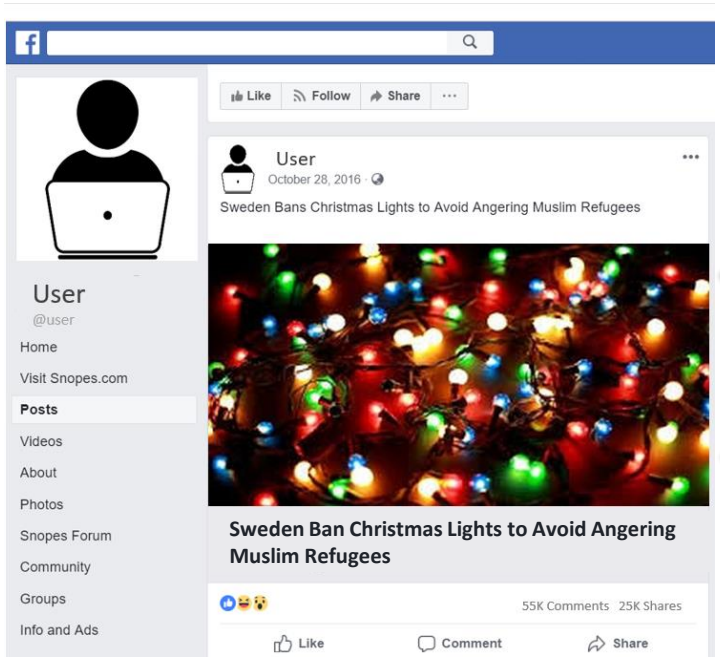
Workshop on
Bias, Disinformation, Misinformation, and Propaganda in Online News and Social Media

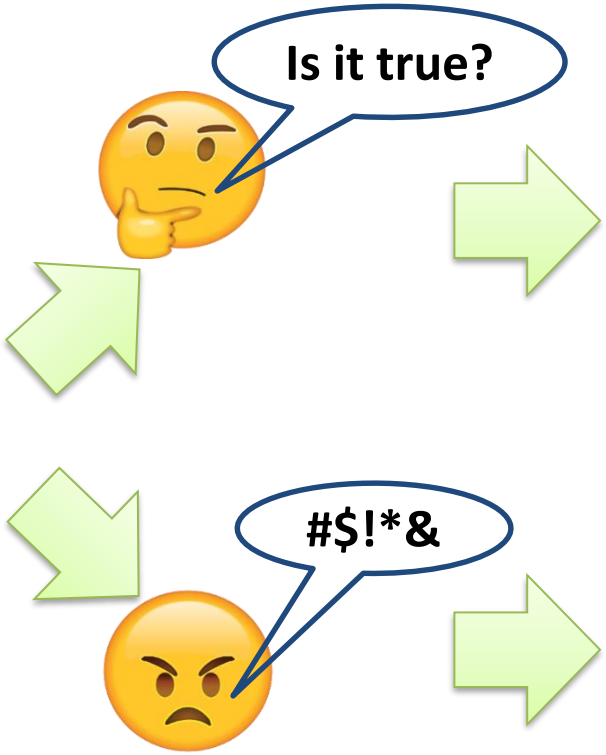
Nov 18th 2019

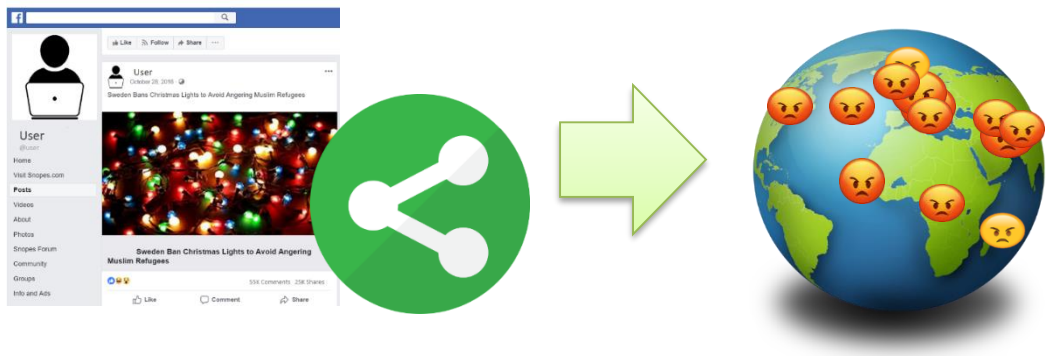
… on May 24th 2017 …

FAKE NEWS

Suspicious news …





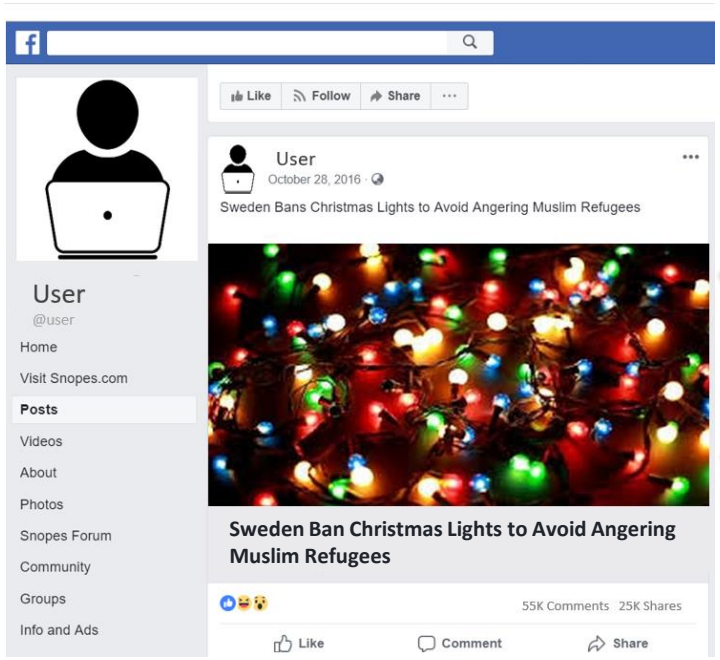


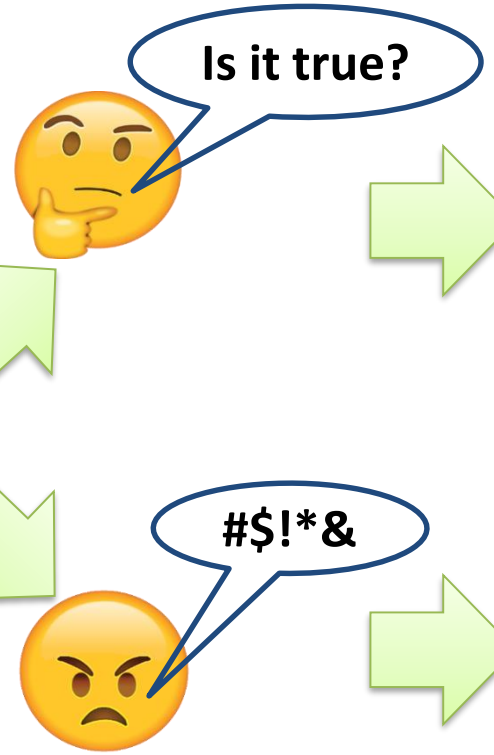
Roadmap …

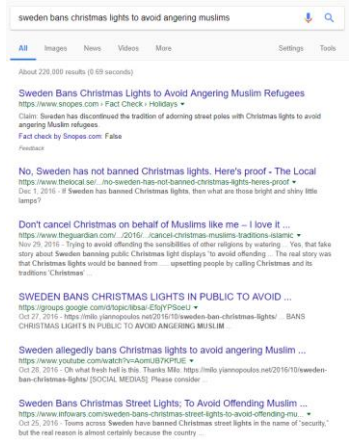
- Are Web search engines really “useful” for this task?
- CheckThat! Lab: 2019-2020
- News background linking
- NPRP project

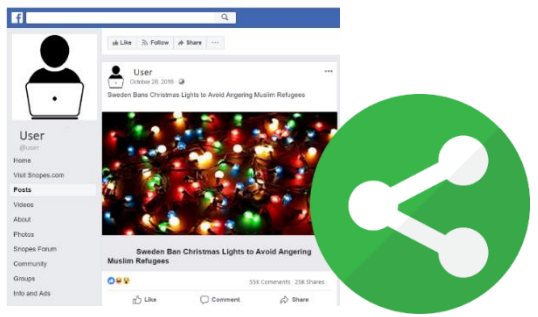
How useful is Web search for fake news detection?

Let’s Search the Web!





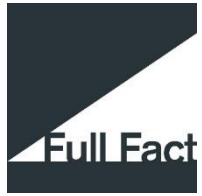




FakeDet: Research on Fake News Detection at Qatar University, Tamer Elsayed

Experimental Setup

- Select claims
  - Fact-Checking Websites



- Retrieve Web pages
  - Retrieved top **20** results, after excluding results from Twitter and fact-checking and video streaming websites.

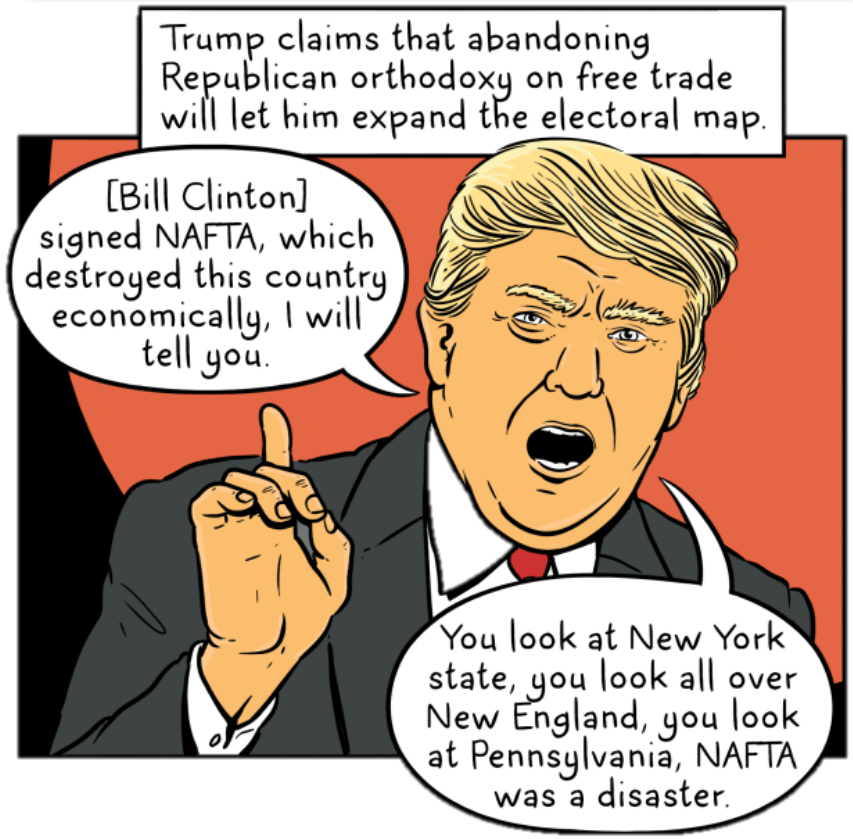
Annotations

- ***Useful* Web Page**: contains ***valid* evidence** to verify the claim, mentions a source, provides statistics, or quotes someone, etc.
  - **invalid evidence**: source cannot be verified, opinion, etc.
- ***Very Useful* Web Page**: sufficient for verification

- Non-relevant (**NR**)
- Relevant but not useful (**RNU**)
- Relevant & useful (**RU**)
- Relevant & very useful (**RVU**)

Annotations

NAFTA has negatively impacted the US economy



Web Page (title)	Label
How a NAFTA Withdrawal Would Hurt the U.S. Economy	**RU**
NAFTA Disadvantages, Problems and Negative Effects	**RNU**
What Would Happen if the U.S. Withdrew From Nafta	**RU**
A Brief Analysis of the Impact of NAFTA on the United States	**RVU**
How NAFTA Will Affect Farmers on Both Sides of the Border	**RNU**
After NAFTA: The Potential Economic Impact for Canada	**NR**

Collection Statistics

# Total Claims	**22**
# True Claims	11
# False Claims	8
# Half-True Claims	3
# Annotated Documents	**440**
% Non-relevant	35.7%
% Relevant & Not Useful	33.2%
% Relevant & Useful	24.5%
% Relevant & Very Useful	06.6%

RQ: Can We Get Better Ranking?

- Learning to rank problem!
- Features
  - Original rank
  - Source credibility: OpenSources, Blacklist & .gov
  - Subjectivity
    - Binary classifier, 2 features: %subjective & %objective
  - Score of Most Relevant Sentence
    - relevance scoring against claim
  - Information Sources and Quotes
    - 2 features: one for citing sources, one for quotes
- Leave-one-claim-out

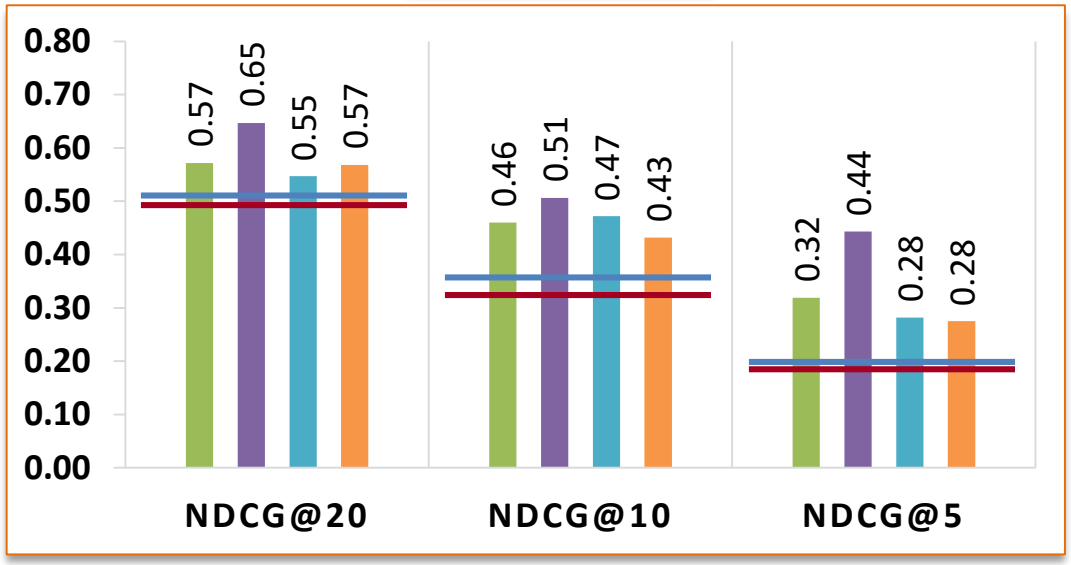
Results

Khaled Yasser
Mucahid Kutlu

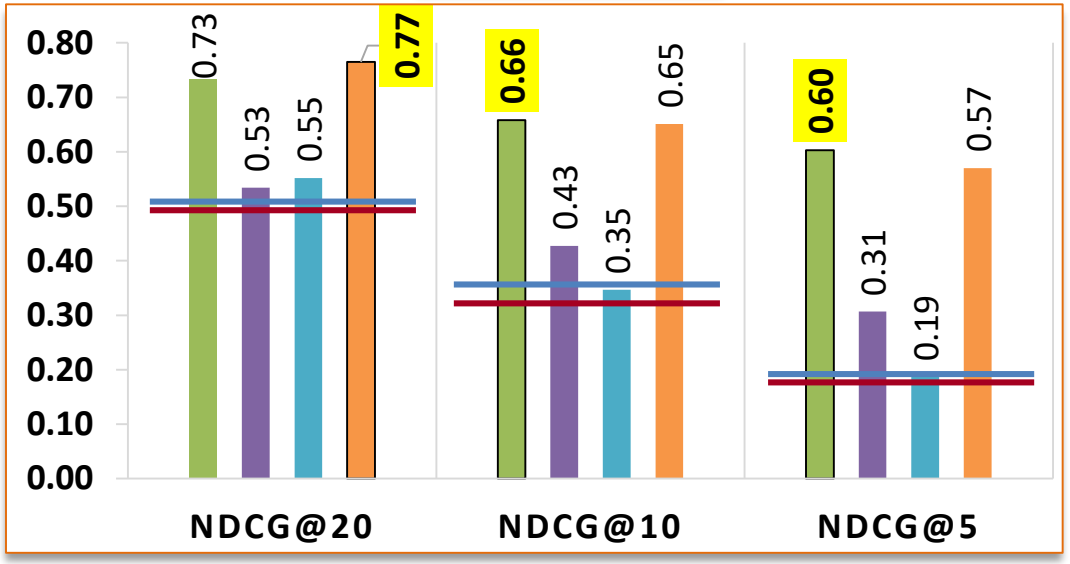
CIKM'2018

OrigRank, RandomRank, MART, RankBoost, Coordinate Ascent, ListNet

Word2Vec



TF.IDF

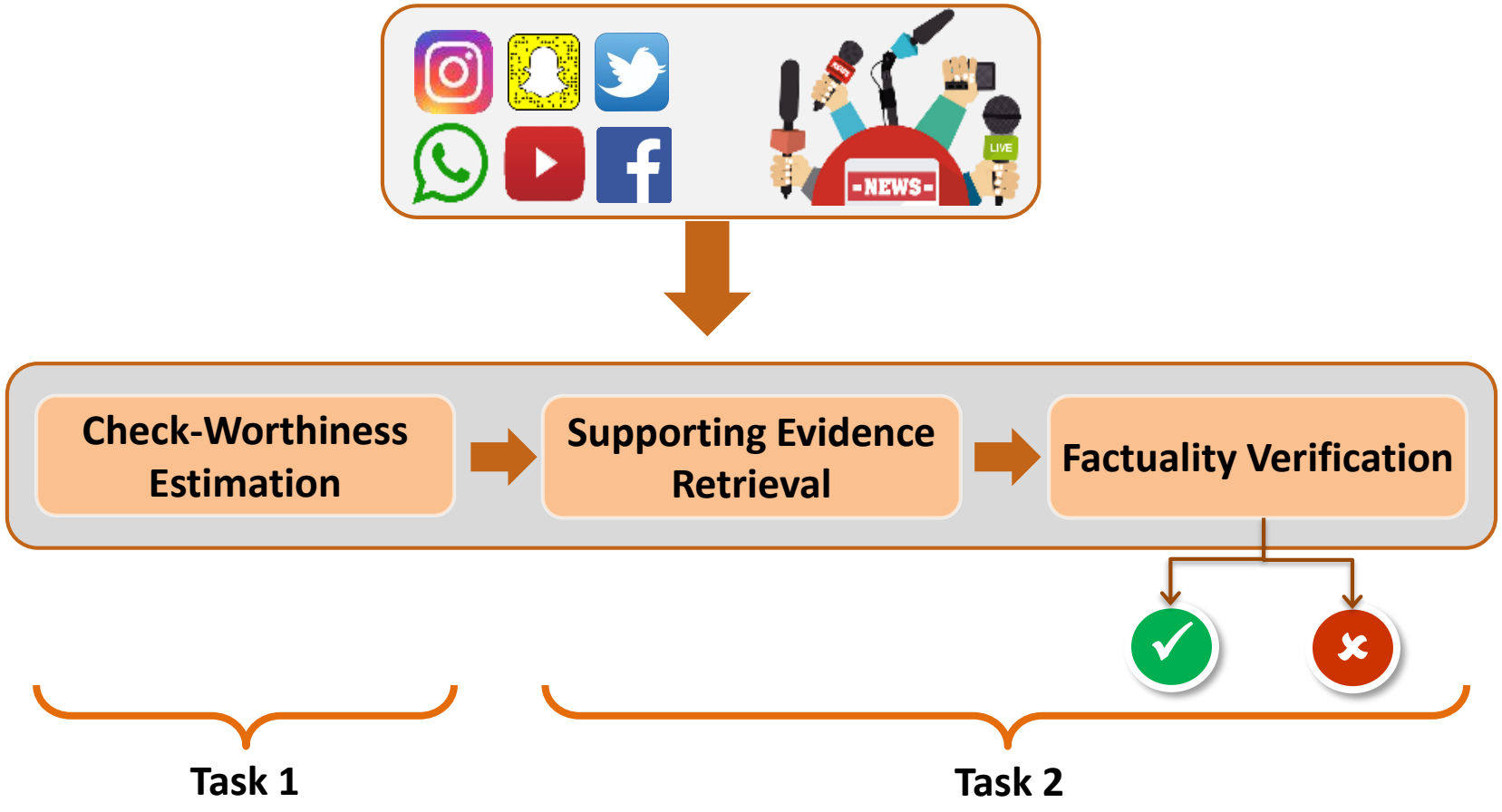


- **Current Search Engines are optimized for relevance not usefulness!**
- **We can get better ranking!**

CheckThat! Lab @ CLEF 2019 …

2nd edition

Information Verification Pipeline



Task 2: Evidence & Factuality AR

Given a claim & retrieved Web pages potentially related to the claim

Usefulness Ranking	Rank the pages based on their usefulness for claim verification
Usefulness Classification	Classify pages as “useful for verification” or “not useful”
Evidence Retrieval	Find passages that are useful for claim verification
Claim Verification	Label the claim as factually “true” or “false”

Dataset & Annotations

	Claims		Pages		Passages	
Set	Total	TRUE	Total	Useful	Total	Useful
Training	10	5	395	32	167	54
Test	59	30	2,641	575	1,722	578

الادعاء CT19-T2-077:
سحب الاتحاد الأفريقي لكرة القدم تنظيم نهائيات كأس أمم أفريقيا من الكاميرون.

CAF has withdrawn the organization of the African Nations Cup finals from Cameroon!

Participants' Approaches

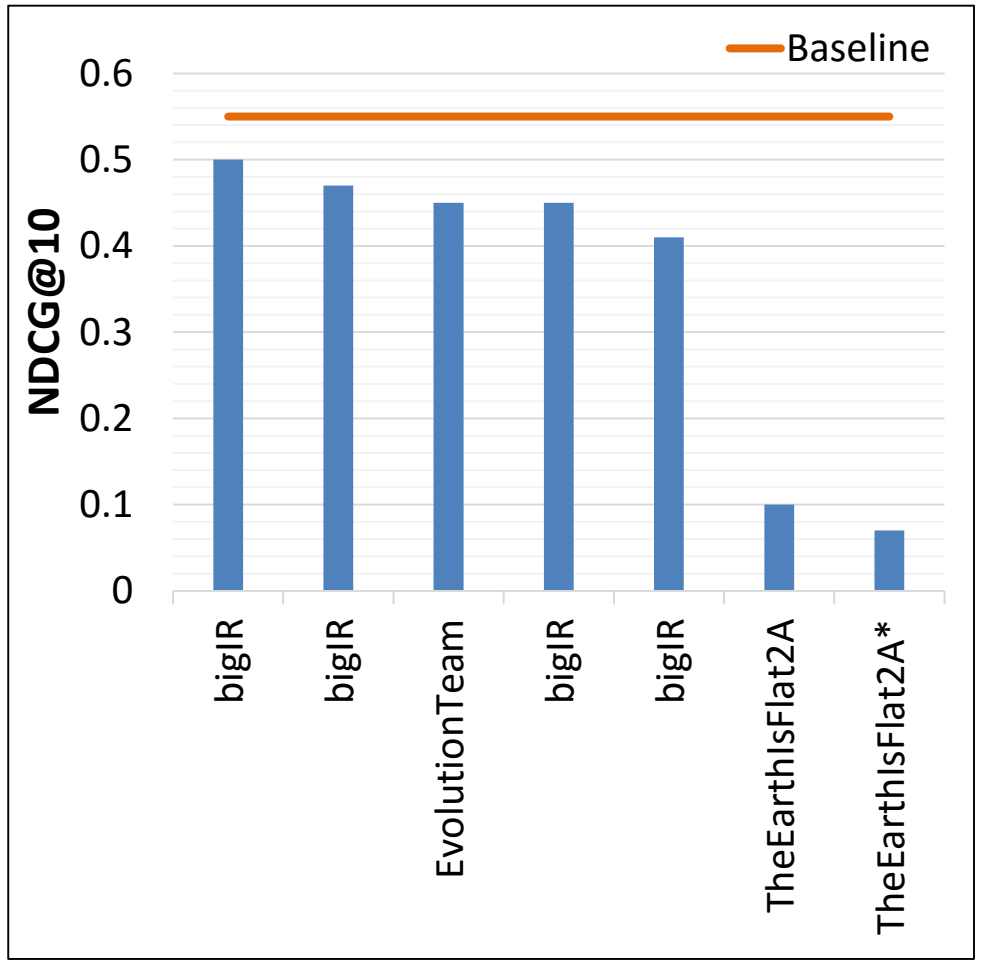
Subtask	A			B				C			D2	
Team	[10]	[12]	[26]	[10]	[11]	[12]	[26]	[10]	[12]	[11]	[12]	[26]
Representation												
BERT embeddings	☑			☑				☑				
Word embeddings		☑			☑	☑				☑	☑	
Bag of words			☑				☑	☑	☑		☑	☑
Models												
Feed-Forward DNN	☑			☑				☑				
Naïve Bayes		☑				☑			☑			
Random Forest		☑				☑			☑		☑	
Gradient Boosting						☑					☑	
Support vector machine		☑				☑			☑			
Enhanced Sequential Inference					☑					☑		
Rule-based					☑					☑		
Features												
Content	☑		☑	☑	☑	☑	☑	☑	☑	☑		☑
Credibility		☑				☑					☑	
Similarity		☑			☑			☑	☑	☑	☑	
Statistical		☑	☑		☑			☑	☑	☑	☑	
External data	☑			☑				☑				

Teams
[10] TheEarthIsFlat
[11] UPV-UMA
[12] bigIR
[26] EvolutionTeam

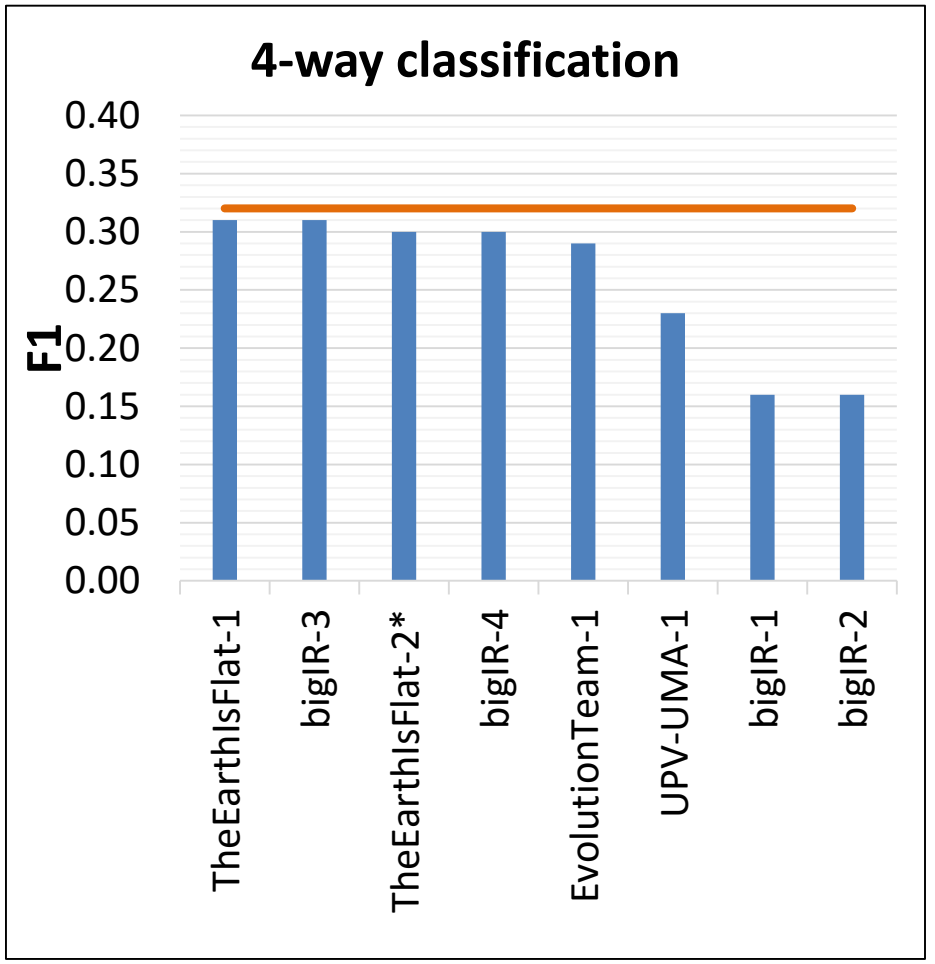
Teams	Runs
4	36

Results

Usefulness Ranking



Usefulness Classification



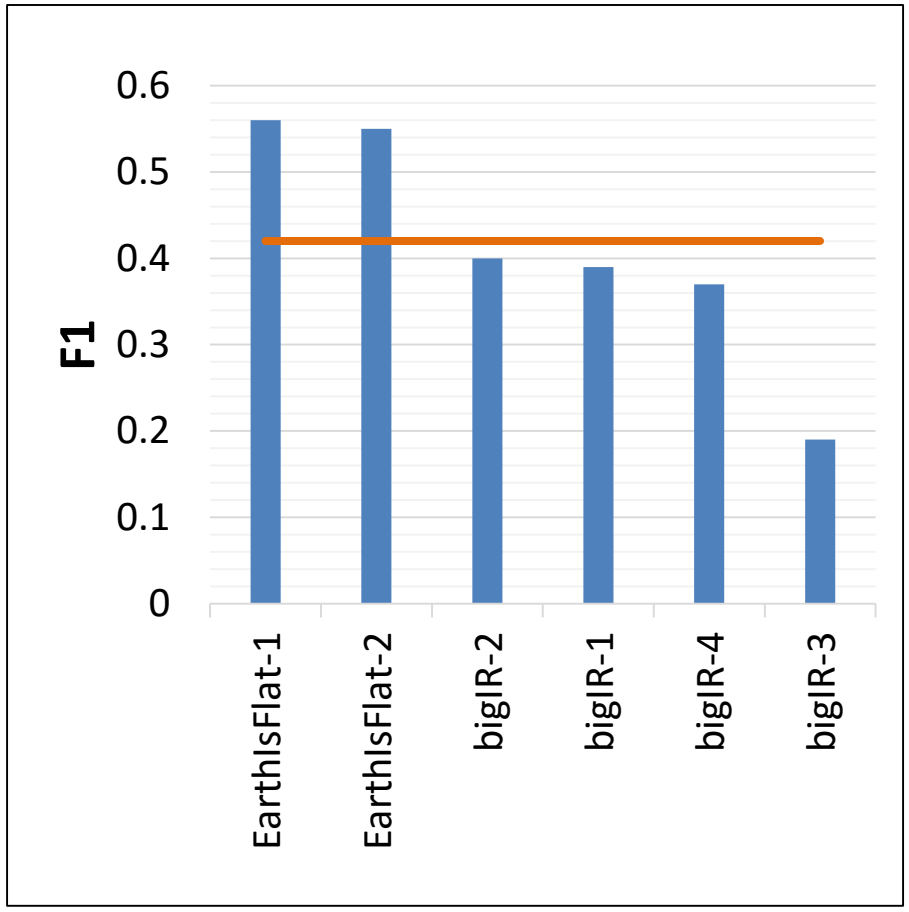
Labels: "*Useful*" vs. "*Very useful*" vs. "*Not useful*" vs. "*Not relevant*"

Task 2: Evidence & Factuality

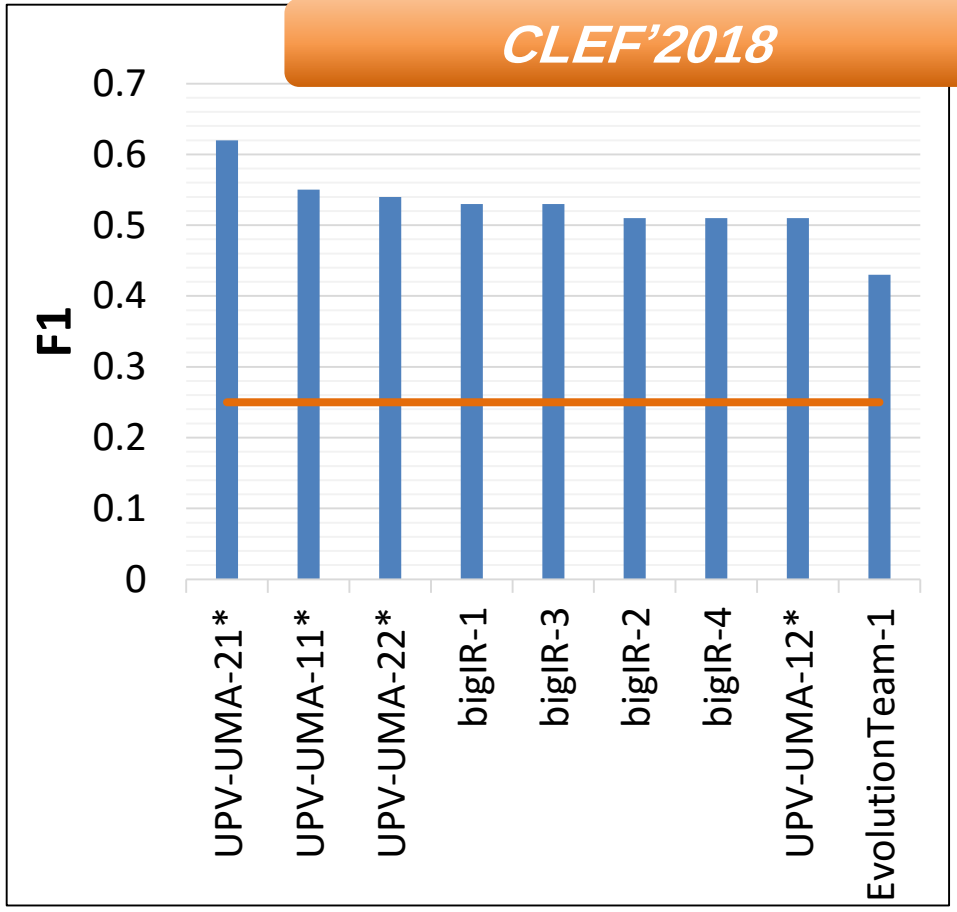
Preslav Nakov
Alberto Barrón-Cedeño
Maram Hasanain
Reem Suwaileh
Giovanni Da San Martino
Pepa Atanasova

CLEF'2018

Evidence Retrieval



Claim Verifi



CheckThat! Lab @ CLEF 2020 …

3rd edition

Some Tweets are Worth Checking …

A good Twitter citizen would verify before spreading the word!

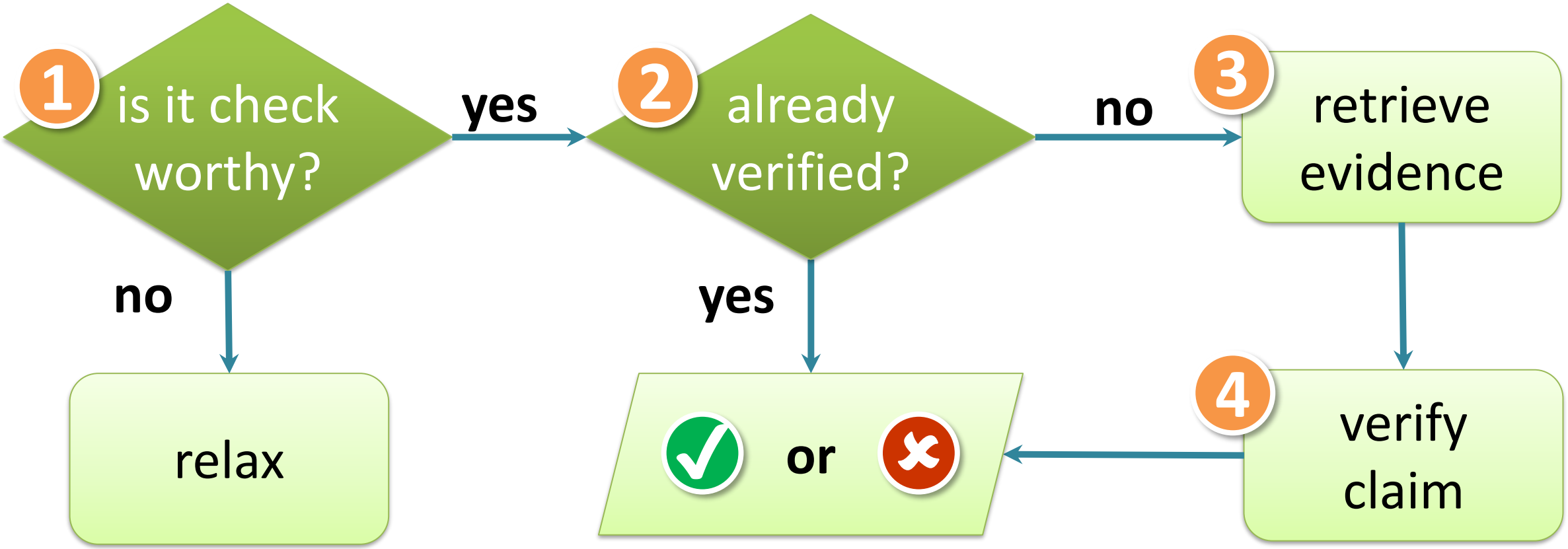
No way!!
@TOP_NOTCH_CONFERENCE2019 has been cancelled!
Hotels in the city are overbooked and the committee has decided to stop everything!
#NOTOPNOTCH #BRINGTOPNOTCHBACK

Don't pay attention to the rumors.
@TOP_NOTCH_CONFERENCE2019 is up and running. I verified it on the official website:

http://www.topnotch2019.org

#TOPNOTCHISSAFE

The good citizen (and journalist) flowchart



CheckThat! 2020

1 Check-Worthiness

Predict which in a **Twitter stream** contains a claim worth fact-checking.

en ar it

2 Verified Claim Retrieval

Given a and a set of **previously verified claims**, determine whether the tweet's claim has been verified.

en

3 Evidence Retrieval

Given a and a list of **Web pages**, retrieve passages useful for verification.

en ar it

4 Claim Verification

Given a and a set of **Web pages/passages**, estimate the veracity of the claim.

en ar it

CheckThat! 2020

Alberto Barrón-Cedeño

Tamer Elsayed

Preslav Nakov

Giovanni da San Martino

Maram Hasanain

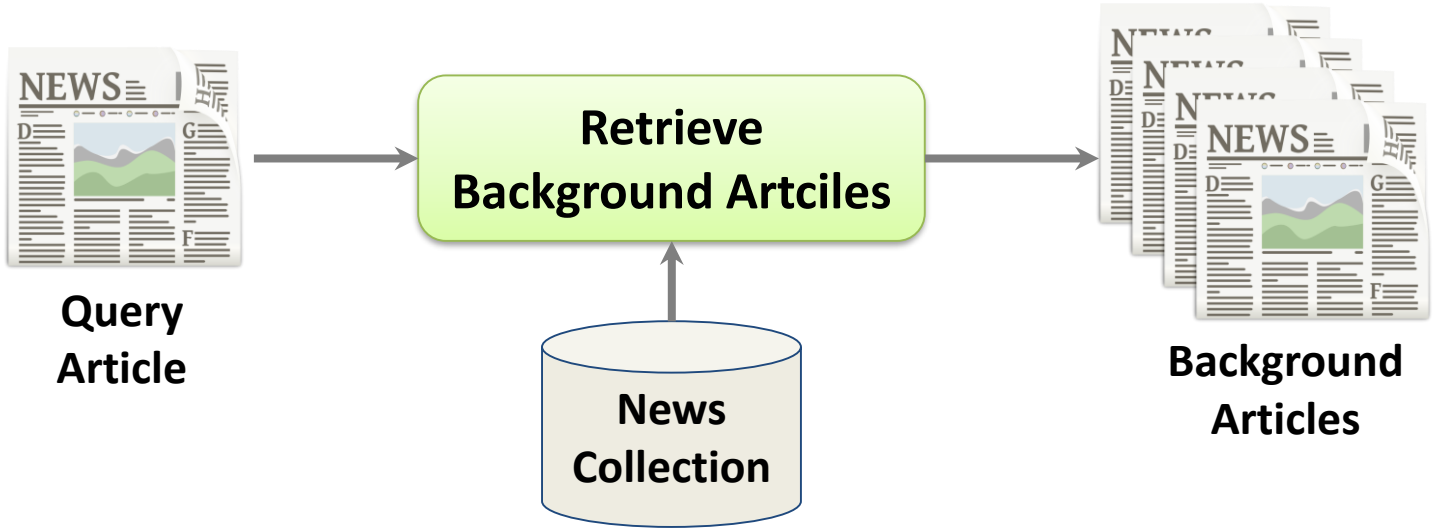
Reem Suwaileh

Fatima Haouari

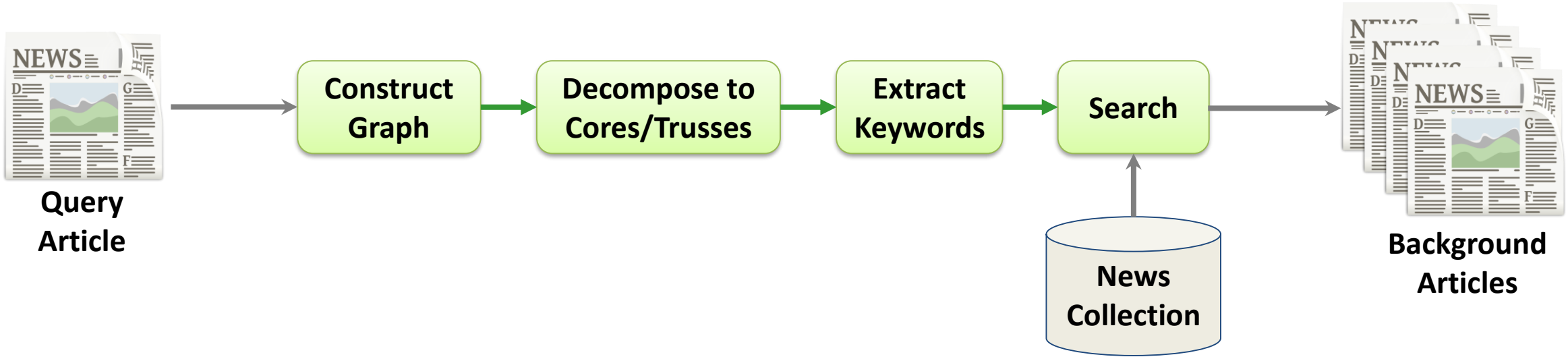
News Background Linking

Research Problem

- Finding background articles that can help news-readers conceptualize the story of a given news article with more knowledge.



Graph-based Approach

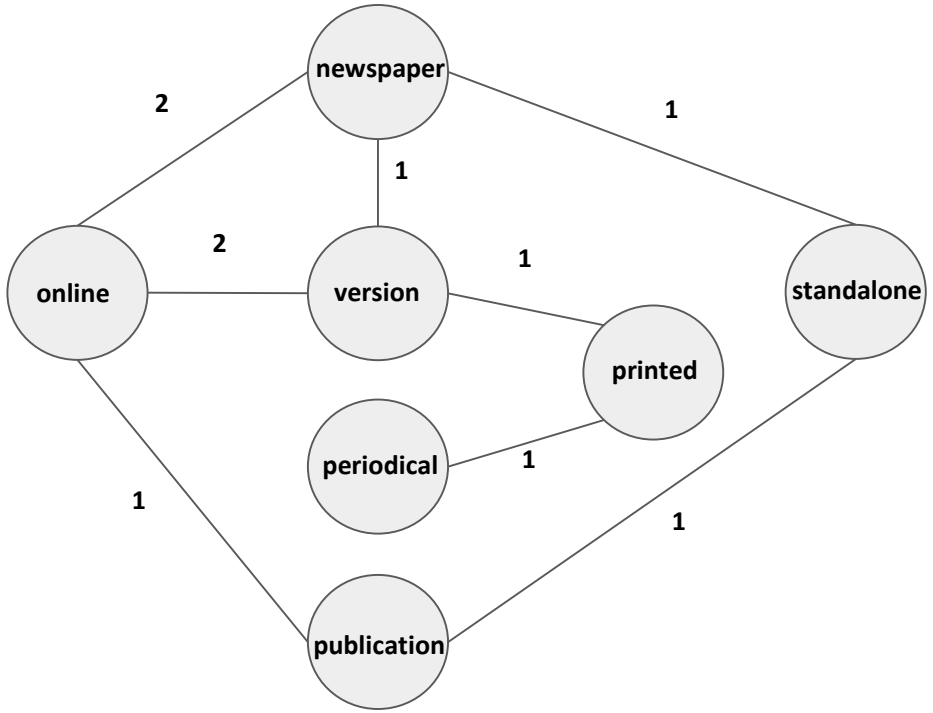


Intuition

- Representation of documents as a bag of words ignores dependencies between terms.
- The best spreaders of information are not the ones with high connections but the one that are placed in the core of the network.

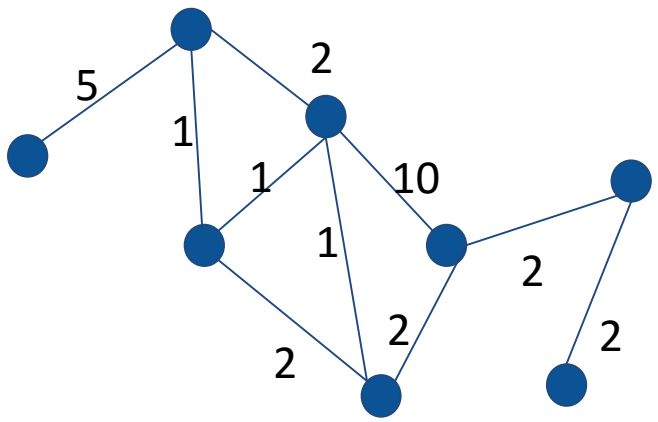
An Article as a Graph …

- Example: “An online newspaper is the online version of a newspaper, either as a standalone publication or as the online version of a printed periodical.”

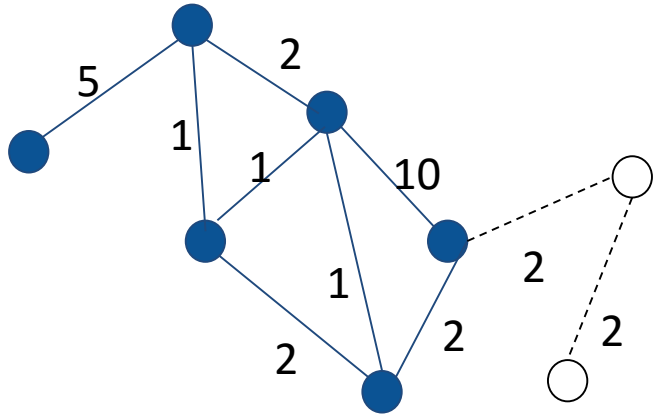


K-Core / K-Truss Decomposition

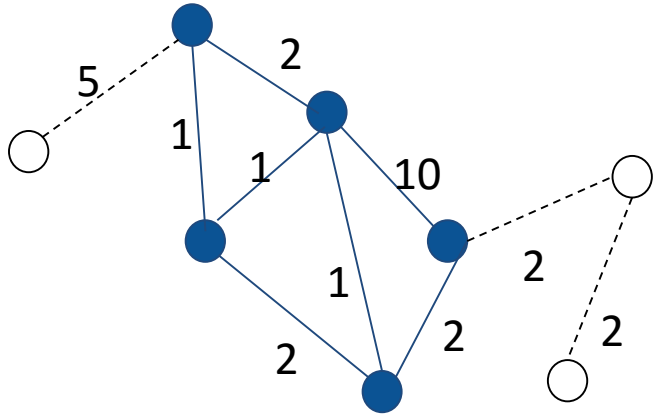
- **K-Core:** A core of order k is a maximal connected subgraph of G in which every vertex has at least k degree
- **K-Truss:** Nodes that have at least k-2 common neighbors are connected in a k-truss by an edge (triangle relationship).



Article' graph



3-Core



3-Truss

Example

- **Query Article**: How China's fishermen are fighting a covert war in the South China Sea
- **Background articles**:
  - China's fishermen explain why they think the sea is theirs.
  - For some Filipino fishermen, the South China Sea dispute is personal.
- **Non-background articles**:
  - Pentagon: Chinese naval ship seized an unmanned U.S. underwater vehicle in South China Sea.
  - What the South China Sea ruling means for the world
- **Keywords**: china 170.0 fishermen 62.9 fishing 75.0 south 57.8 sea 49.3 fish 39.1 **waters** 37.0 chinese 36.0 **boats** 34.0 **maritime** 26.0 **vessels** 27.0 **disputed** 23.0 **spratlys** 23.0 war 17.0 **vietnam** 13.0 **philippines** 13.0 ,.....

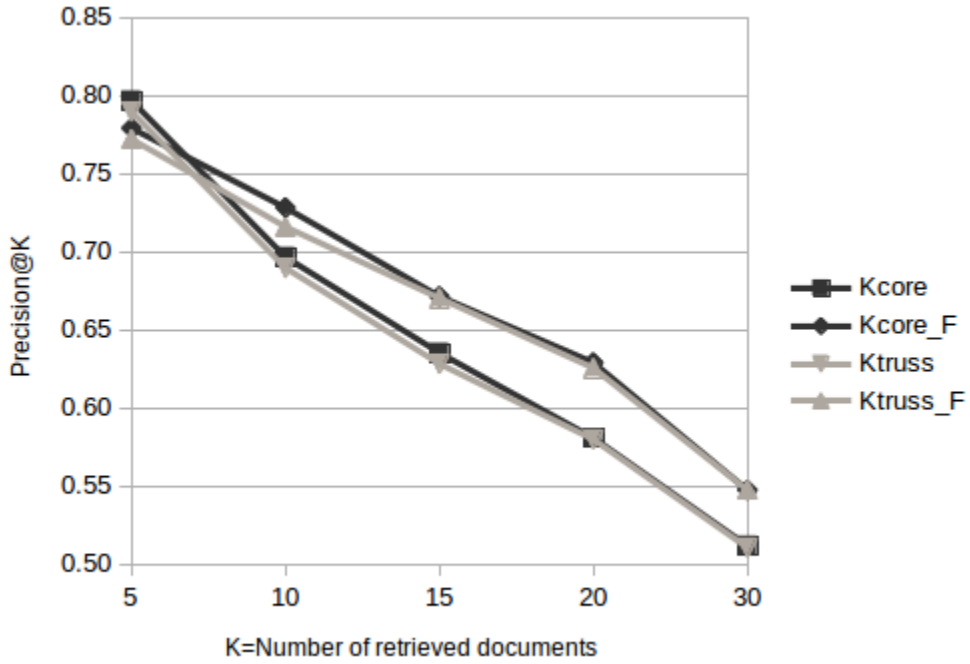
TREC 2019 – News Track

- **Dataset**: Washington Post Collection (~600k news articles)
- **Queries**: 60 query articles

- **Runs**:
  - KCore-based
  - KTruss-based
  - KCore-based *+ forward links*
  - KTruss-based *+ forward links*

Results

Method	nDCG@5
TREC'19-Median	0.5295
QU_KCore	**0.5918**
QU_KTruss	0.5807
QU_KCore_F	0.5723
QU_KTruss_F	0.5689

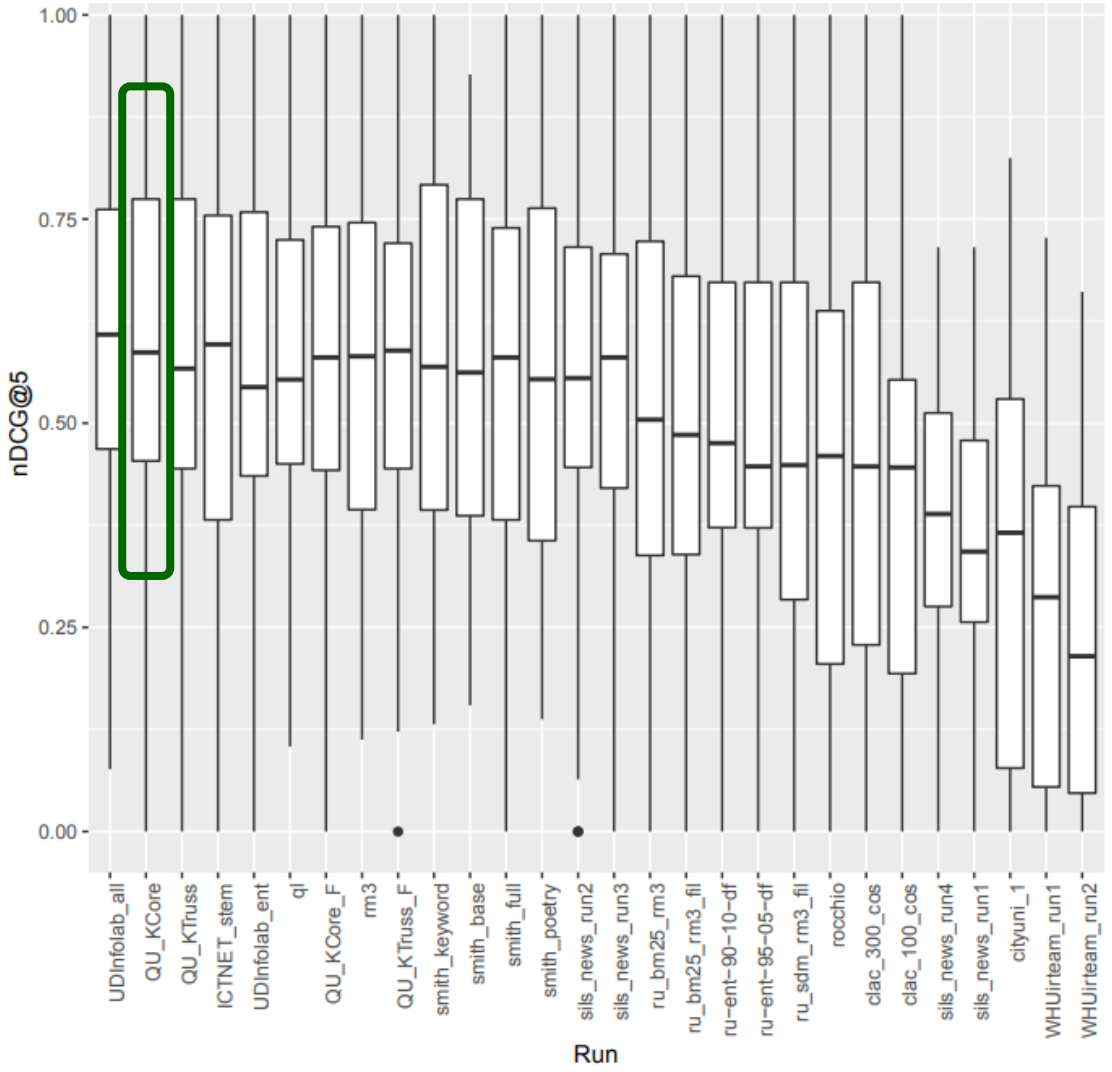


Results

Marwa Essam

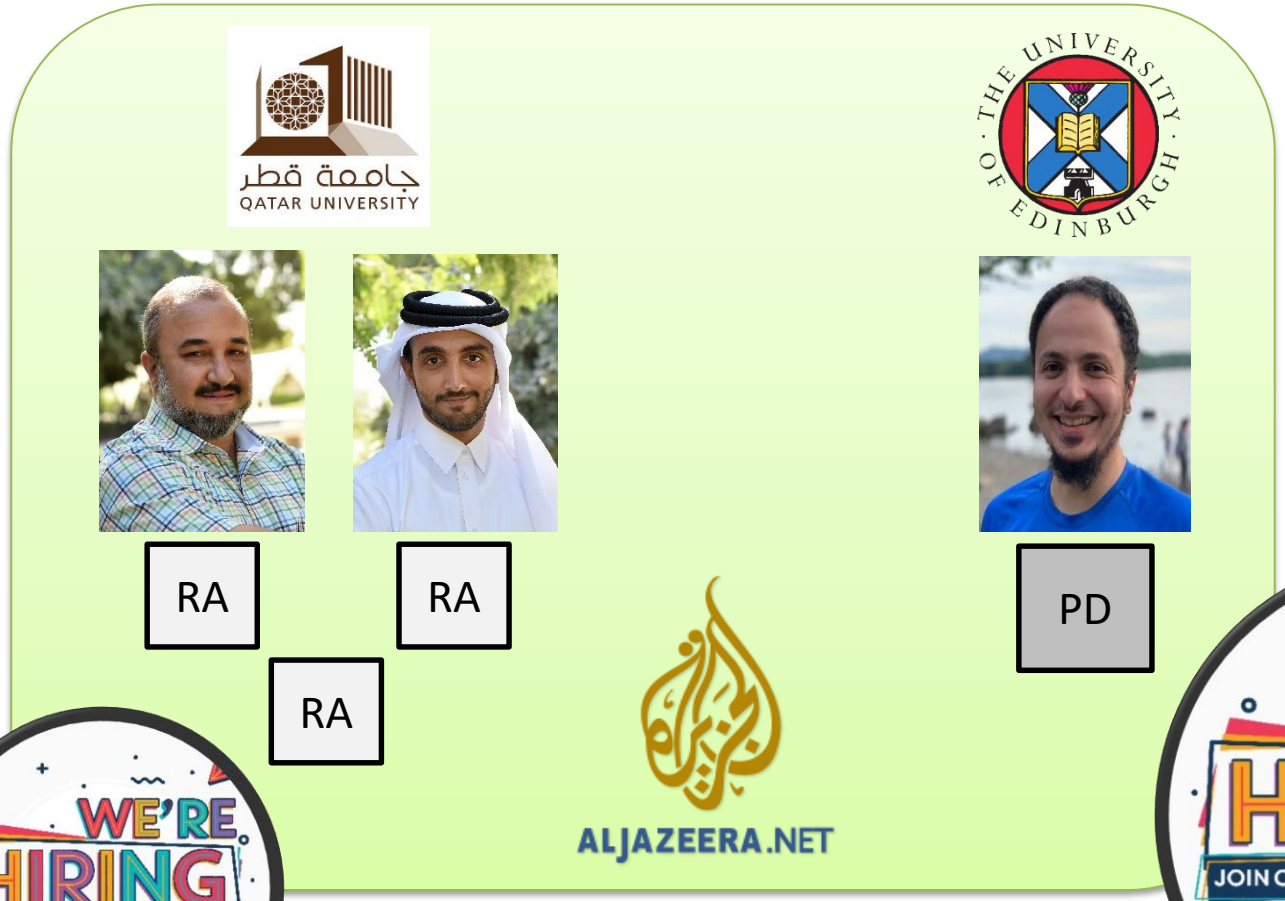
TREC'2019

Brute-force:
~945 (416 unique) words
KCore:
~97 words



FakeDet NPRP Project: Early detection of fake news over Arabic social media

Project Team



Objectives

- Build a **real-time** system for **Arabic** fake news detection.
  - on social (and mainstream) media
- Identify **source** & **influencers** behind propagation.
  - and how it was propagated
- Help **end-users** verify time-critical news.
  - with friendly interfaces

Just starting …

Conclusion

- Web search for fact checking is needed (but not yet effective!)
- Several interesting tasks at CheckThat lab!
- Graph-based analysis for news background linking is promising!
- FakeDet project just started – join us!

sites.google.com/view/clef2020-checkthat

CheckThat! 2020

@bigIR_group