

Evaluating the Quality of Scientific News Articles Using Social Media and Scientific Literature Indicators

Panayiotis Smeros¹, Carlos Castillo², Karl Aberer¹

¹ École Polytechnique Fédérale de Lausanne (EPFL)
Lausanne, Switzerland

scilens.epfl.ch

² Universitat Pompeu Fabra (UPF)
Barcelona, Catalunya, Spain

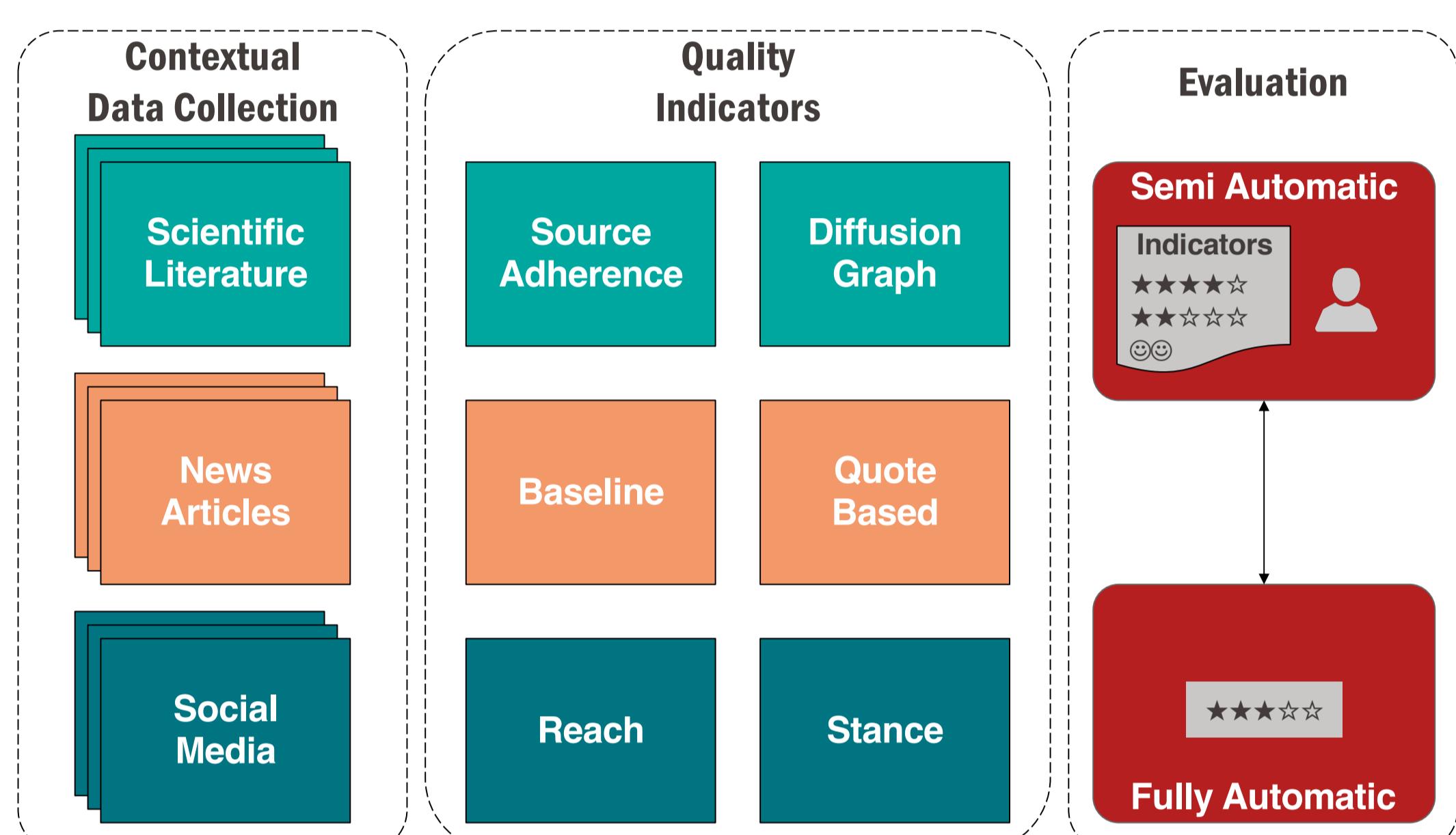
Fake Scientific News...

Causes or Cures Cancer?
obesity biscuits aspirin rice hazelnuts gold

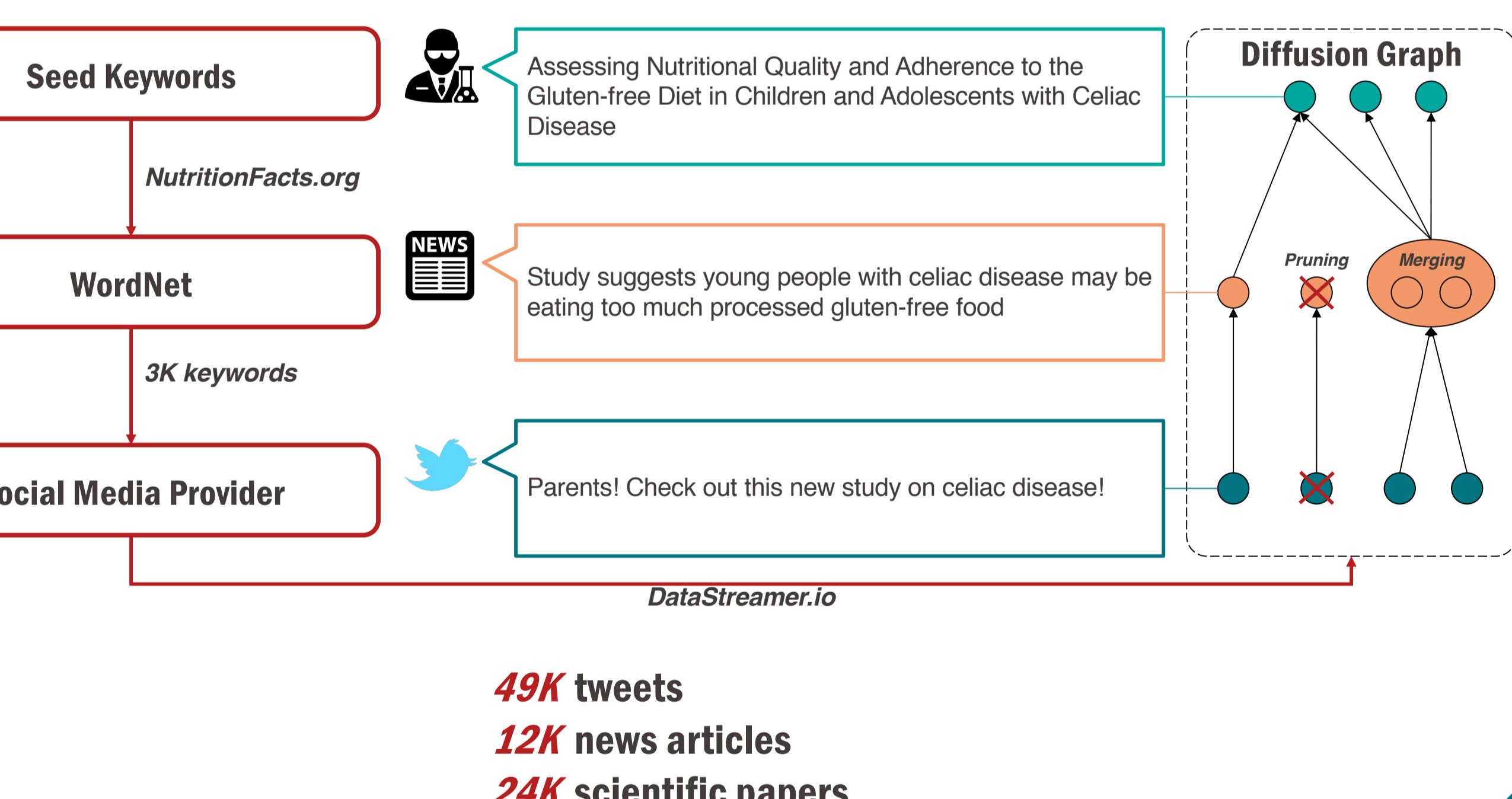


...Fake Scientific News Everywhere

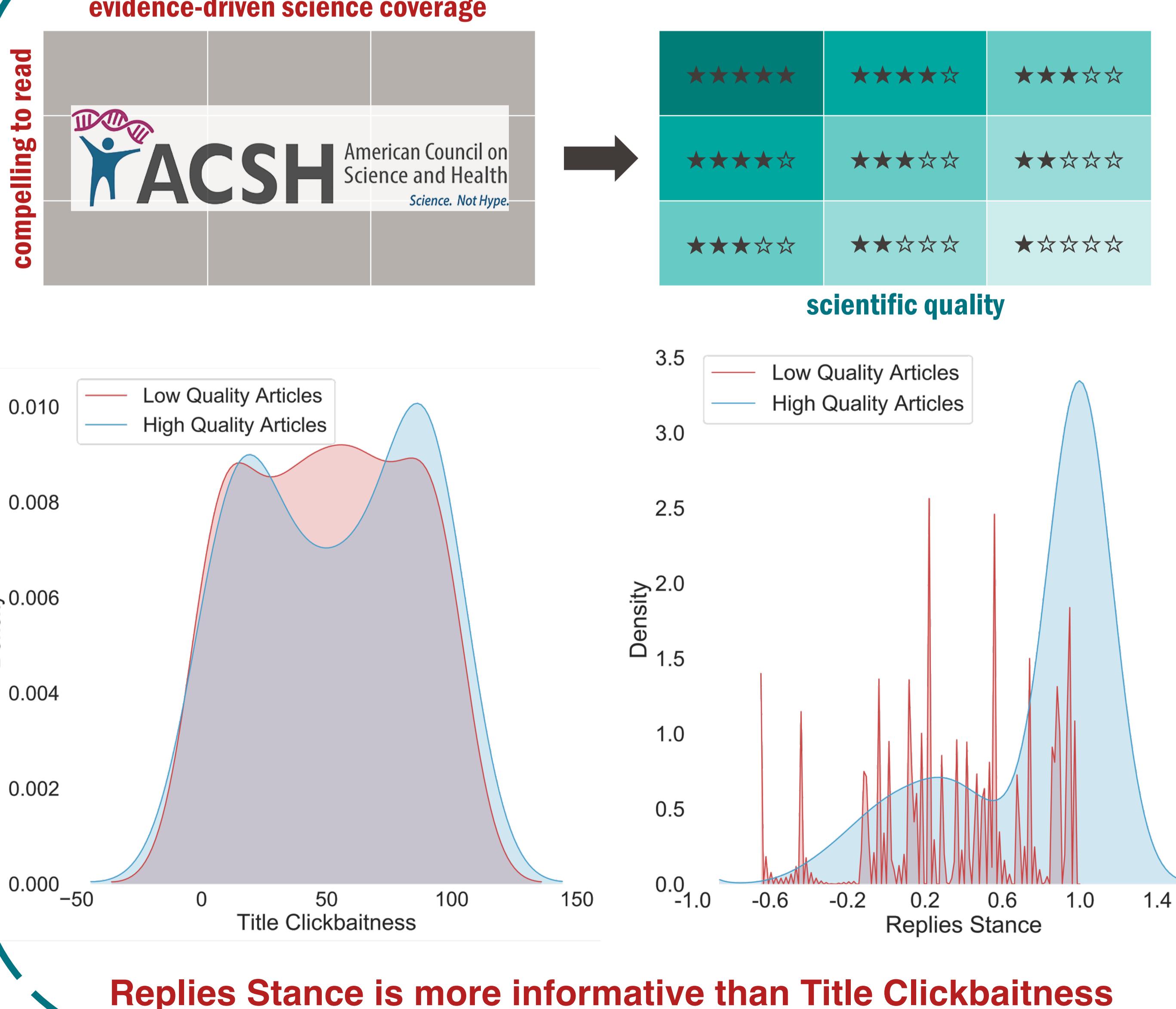
SciLens Overview



Contextual Data Collection



Evaluation



Quality Indicators

Quote-Based

- ✓ Person Quotes
- ✓ "Weasel" Quotes
- ✓ Academic Mentions

<FirstName LastName>, registered dietitian and associate professor at the Department of Agricultural Food and Nutritional Science in University of Alberta

Processed, gluten-free foods are very high in fats and carbohydrates because that's what gives them the flavouring and improved texture, said <LastName>

Quote Extraction

- 1) Complex Regular Expressions with PoS and NER tags combined with:

say reporting verbs claim, "study" terms survey analysis, "scientist" terms researcher expert prove analyze report discovery director professor

2) Disambiguation of Persons and Organizations

Scientific Literature



Should You Be Taking a Curcumin or Turmeric Supplement?

A PLOS ONE study did find, however, that a combination of curcumin and **tomatine**, an antifungal and anticancer compound in tomatoes, inhibited cell growth of prostate cancer.

Fitness Magazine

Combination of **α-Tomatine** and Curcumin Inhibits Growth and Induces Apoptosis in Human Prostate Cancer Cells

Curcumin and **α-tomatine** alone or in combination had a small inhibitory effect on the growth of non-tumorigenic prostate epithelial RWPE-1 cells.

PLOS ONE

Primary Source Classifier

Metrics

- ✓ Jaccard similarity of the entities/dates/numbers/percentages
- ✓ Cosine similarity of the GloVe embeddings
- ✓ Hellinger similarity of the LDA topic vectors
- ✓ Relative difference of the length in words

Granularity

- ✓ Full article
- ✓ Paragraph
- ✓ Sentence

We consider:

- positive pairs: single source = primary source
- negative pairs: random samples
- primary source of a multi-sourced article: the source with maximum probability

Social Media



Popularity

- ✓ Likes/Retweets/Replies
- ✓ Followers/Followees
- ✓ Spatial/Temporal Coverage

Stance Classifier

Datasets

- ✓ SemEval 2016 (general purpose)
- ✓ 300 tweets annotated by crowdworkers (domain specific)

Features

- ✓ total/positive/negative/negation words
- ✓ total/fact-checking URLs
- ✓ question/exclamation marks
- ✓ similarity/sentiment of the reply and the original post

Average stance of multi-replies

cross-check

update

- ✓ Alcohol, Tobacco & Caffeine (ATC)
- ✓ CRISPR

20 articles/topic

2 experts/topic

- ✓ Experts (Ground-Truth)
- ✓ Non-Experts (Indicators)
- ✓ Non-Experts (No Indicators)
- ✓ Automatic (Model trained on Indicators)

	RMSE (ATC)	RMSE (CRISPR)
Non-Experts (Indicators)	1.00	0.96
Non-Experts (No Indicators)	1.10	1.96
Automatic	1.00	0.85

Indicators help Non-Experts judge better

Automatic Model judges better than Non-Experts