

Motivation

- Misinformation & Disinformation (MIDIS) is spreading rapidly due to its effectiveness.
- Efforts have been made to develop systems to fight the spread of MIDIS, but they require human intervention, which lacks the needed rapid response.
- We are exploring how to automatically respond to MIDIS by extracting claims from scientific papers and how to effectively communicate our findings to end-users

Summary

- AI-based human-centered design system that extracts scientific article claims and provides evidence to end-user in the form of confidence scores.
- Our system alerts users on how many scientific papers contain information that agrees or disagrees with the information they are reading.

Goal

- Credibility score and explanation based on AI-powered system.
- Web-based interface
- Investigation of end-user trust, influence, and usability

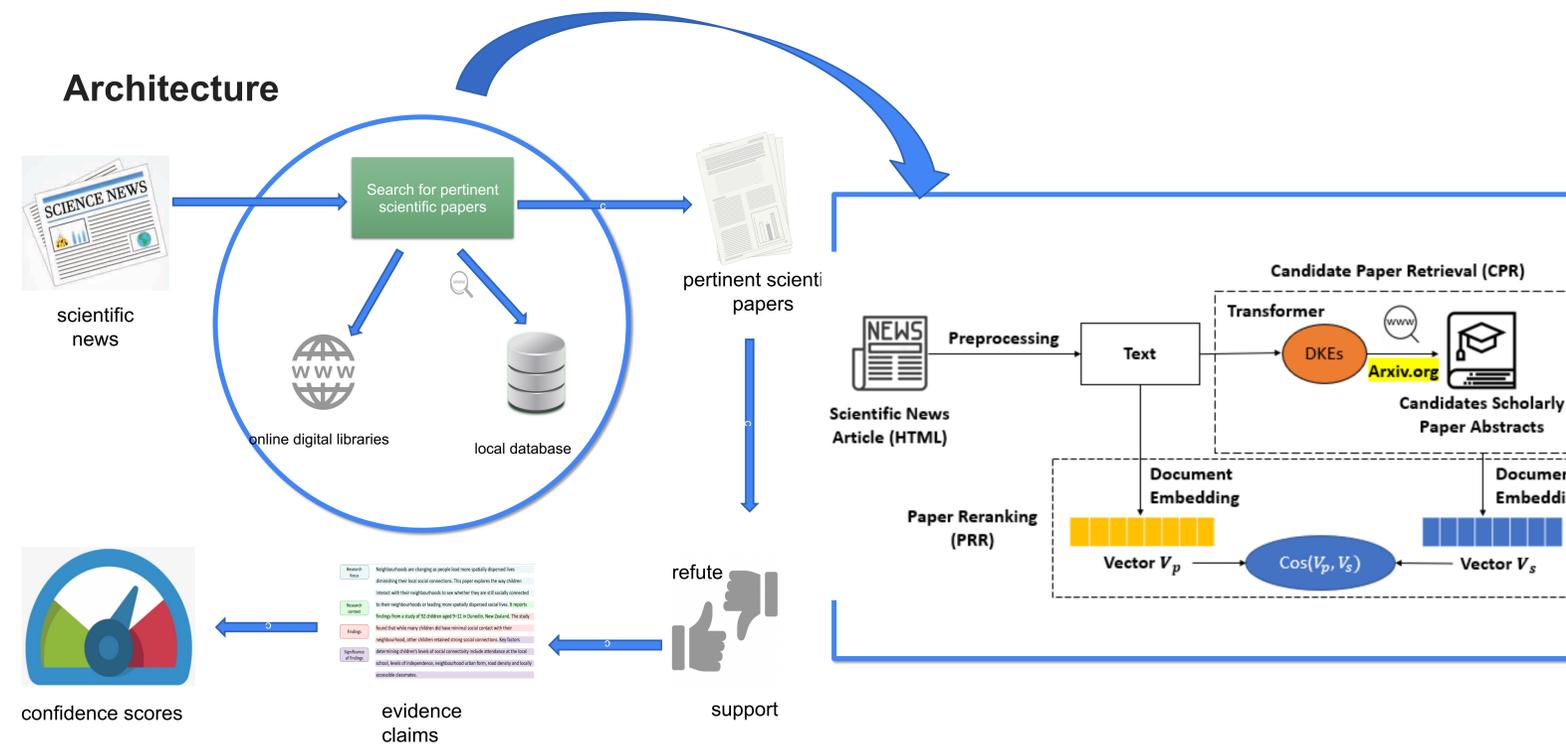
Searching and Labeling

- Use deep discourse model to extract claims from scientific news articles
- Search for pertinent scientific papers via open access APIs
- Predict stances of abstracts based on sentence-level semantics
- A linear model to aggregate stances from labeled papers

Title: SciPEP: an AI-powered Scientific Misinformation Labeler -- A Prototype Design

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Don't look now, but Arctic sea ice mass has grown almost 40% since 2012

Sunday, October 01, 2017 by Tracey Watson

One of the most popular pieces of "evidence" that climate alarmists just love to bring up to prove the global warming narrative is the "all the ice is melting in the Arctic and the polar bears are dying" line. We've all seen the documentaries where a polar bear is desperately clinging to a tiny piece of ice and you just know he's going to die soon. But is any of it really true? What does the latest science really say about the ice in the Arctic circle?

Earlier this month, Climate Depot reported that the latest figures from the National Snow and Ice Data Center, located at the University of Colorado, show that sea ice extent has increased by 40 percent since 2012.

The Danish Polar Portal, which monitors ice and climate in the Arctic, reported on the 12th of September this year:

There has been quite some discussion about Greenland in the climate blogosphere this year. Heavy snow and rain in winter with a relatively short and intermittent summer melt season have left the Greenland ice sheet with more ice than has been usual over the last twenty years – in fact we have to go back to the 1980s and 90s to see a year similar to this one in terms of snow fall and ice melt, though perhaps not for iceberg calving.

If we rank the annual surface mass balance since 1981 from low to high, the lowest on record was 2011-2012 (38 Gt) and this year is the 5th highest out of the 37 year record. The highest on record 1995-1996 had an end of year SMB of 619 Gt in our records. [Emphasis added]

In fact, Greenland experienced a 10 times higher level of surface ice than it did five years ago. And confirming that this is not a fluke occurrence taking place in only one year, Greenland's most well-known glacier – the Petermann Glacier – has been growing slowly and steadily for the past five years.

SciPEP Implementation

- Left window: original news
- Right window: results returned by the AI-powered labeler, including
 - (1) A graphical view for the confidence score
 - (2) Metadata of pertinent papers
 - (3) Numbers of papers in each stance
- Snopes.com serves as the human intervention comparison to validate the system effectiveness.

SciPEP Snopes Assessment

Credibility score: 0.2 (low)
Based on 100 relevant papers and 120 pertinent claims.
[More relevant papers and claims.](#)

Relevant paper 1: Refute

Title: Global warming releases microplastic legacy frozen in Arctic Sea ice
Authors: Rachel W. Obbard, Saeed Sadiq, Ying Qi Wong, et al.
Leading institution: Dartmouth College, NH
Journal: Earth's Future. Year: 2014. Citations: 540
Pertinent claim 1: Global climate models, such as that of Gregory et al. (2002), suggest that the decline in Arctic Sea ice volume (3.4% per decade) will actually exceed the decline in sea ice extent, something that Laxon et al. (2013) have shown supported by satellite data.

Relevant paper 2: Refute

Title: Dramatic decline of Arctic sea ice linked to global warming
Authors: Juhi Yadav, Avinash Kumar, Rahul Mohan
Leading institution: Ministry of Earth Science, India
Journal: Natural Hazards. Year: 2020. Citations: 3
Pertinent claim 1: Arctic sea ice has declined rapidly over the past four decades at the rate of ~ 4.7% per decade leading to an imbalance in the oceanic heat flux.
Pertinent claim 2: The study reveals that the land-ocean warming processes intensifying the sea ice loss and also leading in disruption of the global ocean circulation.

Relevant paper 3: Refute

Title: Loss of Sea Ice in the Arctic
Authors: Donald K. Perovich and Jacqueline A. Richter-Menge
Leading institution: Cold Regions Research and Engineering Laboratory, NH
Journal: Annual Review of Marine Science. Year: 2009. Citations: 282
Pertinent claim 1: Evidence also points to a decrease in sea ice thickness and a reduction in the amount of thicker perennial sea ice.
Pertinent claim 2: A general global warming trend has made the ice cover more vulnerable to natural fluctuations in atmospheric and oceanic forcing.

Domain Knowledge Entity Extraction

- Entities that represent domain knowledge
- DKEs exists in news articles and research papers

News article:
The star in question is called AG Draconis: a well-known binary star that's been observed by astronomers since the late 19th century.

Research paper:
AG Draconis is a strongly interacting binary system which manifests characteristic symbiotic activity of alternating quiescent and active stages.

- Transformer model for DKE extraction (F1=0.92—1.00).

Experiments

- Source news: extracted from snopes.com and sciencealert.com.
- Use DKEs to find candidate papers from search engine APIs, such as arXiv or SemanticScholar
- Use BERT to encode documents
- Claim verification models trained on snopes.com dataset (Hanselowski et al. 2019 CoNLL)

Psychological User Study (ongoing)

- IRB Application approved
- Design experimental materials
- Recruiting participants
- Assessment usability and contrast with Snopes.com
- Completing statistical analyses

Deliverables

- SciPEP: an AI-powered credibility labeling system for scientific news
- A dataset containing fake scientific news, manual debunking information from Snopes.com, scientific papers and claims.
- A survey dataset about scientific misinformation for future study
- Psychological assessment and analytical results as a preliminary work for future fund

Federal Grant Enabled

- NSF REU on disinformation \$324k (2022-2024)
- Co-PI: Jian Wu

