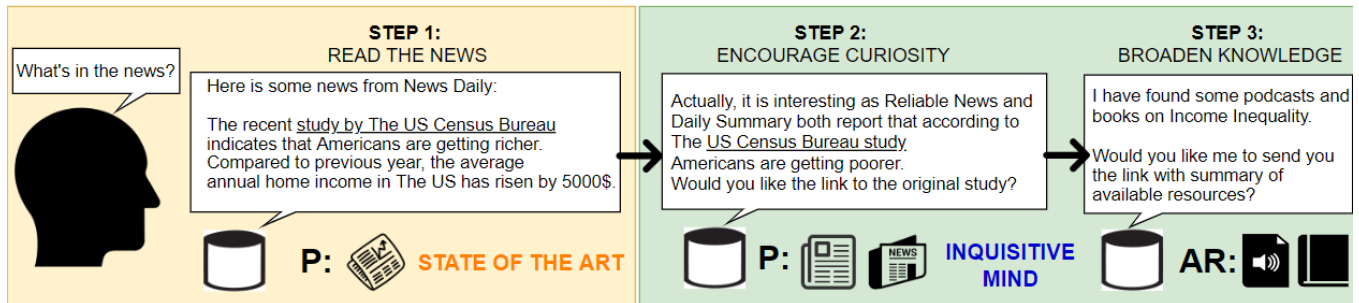# Inquisitive Mind: A Conversational News Companion

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Figure 1: Conversational Agent *Inquisitive Mind* (IM) Interaction Example. Steps 2 and 3 are proposed extension over the current state of the art. Having presented a news story to the user (Step 1), IM informs them about alternative coverage of the story by different content providers (P), and asks if the user would like to refer to the original study on which the story is based (Step 2). Finally (Step 3), IM suggests additional resources (AR) that can provide the user with more background information e.g. podcasts and books on the relevant topic.

ABSTRACT

With an ever-increasing amount of information and ever-more-hectic lifestyles, many people rely on news briefs to stay up to date. Consequently, the reliance on single-source media narratives can lead to a biased and narrow perception of the world. Conversational interfaces, as a medium for delivering news stories, can help to address this problem by encouraging users to explore information resources and news stories by formulating curiosity driven comments and questions. We propose Inquisitive Mind (IM) - a conversational companion that proactively points out different narratives of the story, refers users to source materials, and encourages deeper exploration of the topic. We argue that IM could foster curiosity, encourage critical thinking, and effectively lead to more conscious media consumption.

KEYWORDS

Conversational Interfaces, Proactive Agents, News Coverage Bias

1 INTRODUCTION

Information literacy, i.e. the ability to find, evaluate and use information effectively, is considered a fundamental competence for an active and intelligent participation in modern society (cf. [13]). The skills of independent judgement and critical thinking are not only the attributes of a well-informed citizen ([9, p.3]) but also safeguards of democracy [11, 12]. However, due to the overwhelming amount of available news coverage (approx. 1200 of news stories are published daily in Washington Post alone [2]), staying well-informed becomes increasingly challenging. Conversational Agents (CAs) such as Amazon's Alexa, Apple's Siri and Google's Assistant and their smart speakers instantiations are becoming more popular (cf. [15, p.26)]). An increasing number of people are using CAs to stay up to date. However, in spite of the recent attempts to provide more detailed news coverage [7], most of the news stories are fragmented and lack context [6].

A central issue with media coverage is how the news content is curated. According to Benkler, information production systems employ news content selection by *filtration* (choosing what is adequate) and *accreditation* (choosing what is credible) [3, p,105]. Unfortunately, the decisions with regards to the content adequacy and credibility are based on the preferences of the person selecting the information and not the one seeking it. A second issue is the so-called *Filter Bubble*. Coined by Pariser [18], the term refers to search results being modified based on previous search history - consequently limiting exposure to new information and different world views. To mitigate the effects of fragmentary media coverage and the impact of the *Filter Bubble* , we propose a conversational news companion - Inquisitive Mind (IM) (illustrated in Figure 1). IM aims to allow for more serendipitous news exploration by proactively referring users to source of news stories and fostering curiosity by mentioning alternative narratives.

2　ACCESSING NEWS VIA VOICE - CA POTENTIAL

The number of CAs has increased rapidly in the recent years. According to the Statista Group report [20], within a year, the number of smart speakers in American households has almost doubled (from 67m in December 2017 to 119m in December 2018). The report identified "looking for news" as the most popular smart speaker function, used by 82% of the respondents. Another research study which investigated information engagement practices [10] found that many US students regularly access their news via voice. The growing popularity of CAs is also apparent outside of the USA. The international survey (N=3500) by Garcia et al. [8] found that the number of regular users of conversational agents (i.e. people who used them daily) is on the rise.

The increasing prevalence of CAs brings both challenges and opportunities. On one hand, it creates yet another platform for propagating fragmented and oversimplified media narratives (aka "fast news"); on the other, it also creates opportunities to proactively foster critical thinking and encourage independent exploration of the news content.

3　STAYING UP TO DATE REQUIRES EFFORT

Due to the sheer volume of media coverage, for many people engaging with news has become a chore which requires evaluate everything they hear or read for truth and objectivity (cf. [10]). Navigating media narratives requires critical thinking, a skill which can effectively be developed through reading literature (cf. [14, 22, 23]). Unfortunately, less and less people are actively engaging in thorough exploration of written sources and expanding their background knowledge. According to American Time Use Survey [16] the number of people who read for personal interest is steadily declining with the average American aged 15-44, reading for 10 minutes a day or less.

In order to support a more involved interaction with media content, we propose a proactive CA, Inquisitive Mind. The goal of the agent is to foster critical thinking through consultation of the source material, exploration of alternative narratives, and, ultimately acquiring more contextual knowledge from different sources.

4　NEWS COMPANION - INQUISITIVE MIND

An example interaction with Inquisitive Mind (IM) is provided in Figure 1. The conversation with IM begins when a user asks for news summary. The example interaction is based on a hypothetical news story used to illustrate news coverage bias. In the story, mean income over the whole population is used to support the argument that Americans are getting richer. This could create a distorted vision of reality as the national average would be skewed by the top earners ("the outliers effect"). Instead, using median and providing information on different income brackets (data that is likely featured in the source article) can provide a more accurate picture.

In order to facilitate disclosure of the potential bias of media stories, and encourage further exploration of the context, we propose that IM should take the following steps:

(1) **Examine what source of information the news story is based on**. This could be done by scanning the news story for links to articles (if they are provided) or by extracting Named Entities (e.g. The US Census Bureau) and retrieving the source article, or the link to the website of the institution/research body that published it.

(2) **Aggregate news content from multiple providers and point out alternative narratives of the story**. For instance IM could say: "Actually, that is interesting! Today *ReliableNews* and *Daily Summary* reported that poverty levels in the USA are increasing." Alternative narratives can be selected by contrastive sentiment analysis between the original news story and stories where opposing views are presented (promising results were achieved for assessing comments mood of social media stories [1]). IM can then suggest the user to consult the source article/website of the publisher for further information. If the user agrees, the article is emailed to them and a reminder is set to consult it later. The core premise is to promote curiosity by highlighting contradictions in different narratives and encourage deeper exploration to understand the context of the featured story.

(3) As a followup, once the user has consulted the source article, IM can **ask if they are interested in expanding their knowledge on the subject** (e.g. Income Inequality etc.) and suggest additional resources such as podcasts and books. Natural Language Inference (NLI) [4, 17] can be used to ensure that the recommended sources are accurate and based on evidence. NLI is already used in fact-checking [19, 21].

4.1　Proactive Engagement - Potential Benefits

We believe that potential benefits of our pro-active news reading companion are increased awareness of news coverage bias (as users are exposed to of alternative narratives) and improved media-literacy (as users are encouraged to engage in evaluation of source materials). IM has potential not only to provide additional context to news stories but also to help to overcome *Filter Bubble* by referring users to sources that they may be unaware of. Additionally, IM could help to develop broader knowledge and stimulate interests by proactively recommending additional resources (podcasts, books) and retrieving/reserving them for the user.

4.2　Considerations and Future Research

It should be noted that IM is not intended to be a substitute to individual news reading. Instead, its goal is to support and encourage active exploration of news stories. We are mindful of potential ethical implications that our news companion could have. For example, there are instances where referring the user to too many resources can be misleading (a.k.a. "Balance as Bias" problem) [5], or even harmful when niche/extreme narratives are promoted. Although are the risks associated with transgressing the *Filter Bubble*, they can be overcome with critical thinking. Of course, there is no guarantee that IM will be effective as users can simply ignore its suggestions. However, the sole fact that alternative narratives are pointed out can lead to curiosity and encourage further exploration.

It would be interesting to carry out an empirical assessment of IM to check how socially acceptable and trustworthy it would be. Another possible incarnation of news companion would be an agent who expresses its skepticism and opinions about the presented news content, and engages in debate with the user.

REFERENCES

[1] Firoj Alam, Fabio Celli, Evgeny A Stepanov, Arindam Ghosh, and Giuseppe Riccardi. 2016. The social mood of news: self-reported annotations to design automatic mood detection systems. In *Proceedings of the Workshop on Computational Modeling of People's Opinions, Personality, and Emotions in Social Media (PEOPLES)*. 143–152.

[2] Lukas I. Alpert. 2015. Bezos Takes Hands-On Role at Washington Post. https://www.wsj.com/articles/bezos-takes-hands-on-role-at-washington-post-1450658089

[3] Yochai Benkler. 2001. Siren songs and amish children: Autonomy, information, and law. *NYUL Rev.* 76 (2001), 23.

[4] Samuel R Bowman, Gabor Angeli, Christopher Potts, and Christopher D Manning. 2015. A large annotated corpus for learning natural language inference. In *Conference on Empirical Methods in Natural Language Processing, EMNLP 2015*. Association for Computational Linguistics (ACL).

[5] Maxwell T Boykoff and Jules M Boykoff. 2004. Balance as bias: global warming and the US prestige press. *Global environmental change* 14, 2 (2004), 125–136.

[6] Jon Fingas. 2015. Amazon's Echo speaker reads you the top news headlines. https://www.engadget.com/2015/09/20/amazon-echo-news-headlines/ [Accessed-27-April-2019]

[7] Jon Fingas. 2019. Amazon Alexa provides more detailed news briefings in the US. https://www.engadget.com/2019/04/08/amazon-alexa-long-form-news/ [Accessed-15-May-2019]

[8] Marta Perez Garcia, Sarita Saffon Lopez, and Hector Donis. 2018. Everybody is talking about virtual assistants, but how are people really using them?. In *Proceedings of the 32nd International BCS Human Computer Interaction Conference*. BCS Learning & Development Ltd., 96.

[9] Dan Gillmor. 2010. *Mediactive*. Dan Gillmor.

[10] Alison J Head, John Wihbey, P Takis Metaxas, Margy MacMillan, and Dan Cohen. 2018. How Students Engage with News: Five Takeaways for Educators, Journalists, and Librarians. (2018).

[11] Edward S Herman and Noam Chomsky. 2010. *Manufacturing consent: The political economy of the mass media.* Random House.

[12] Christopher Koliba. 2000. Democracy and Education, Schools and Communities Initiative: Conceptual Framework and Preliminary Findings. (2000).

[13] Tibor Koltay, Sonja Špiranec, and Laszlo Z Karvalics. 2015. The shift of information literacy towards research 2.0. *The journal of academic librarianship* 41, 1 (2015), 87–93.

[14] Aldeen B Markle. 1987. Developing Critical Thinking Skills through Literature. *School Library Media Quarterly* 16, 1 (1987), 43–44.

[15] Mary Meeker and Liang Wu. 2018. Internet trends 2018.

[16] Bureau of Labor Statistics United States Department of Labor. 2017. American Time Use Survey. https://www.bls.gov/news.release/atus.nr0.htm/ [Accessed-27-April-2019]

[17] Ankur Parikh, Oscar Täckström, Dipanjan Das, and Jakob Uszkoreit. 2016. A Decomposable Attention Model for Natural Language Inference. In *Proceedings of the 2016 Conference on Empirical Methods in Natural Language Processing*. 2249–2255.

[18] Eli Pariser. 2011. *The filter bubble: What the Internet is hiding from you.* Penguin UK.

[19] Dean Pomerleau and Delip Rao. 2017. Fake news challenge. http://www.fakenewschallenge.org/

[20] Statista. 2018. Smart speakers - Statistics & Facts. https://www.statista.com/topics/4748/smart-speakers/[Accessed-30-April-2019]

[21] J Thorne, A Vlachos, C Christodoulopoulos, and A Mittal. 2018. FEVER: a large-scale dataset for Fact Extraction and VERification. In *Proceedings of the 16th Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*. Sheffield.

[22] Chi-An Tung and Shu-Ying Chang. 2009. Developing critical thinking through literature reading. *Feng Chia Journal of Humanities and Social Sciences* 19, 3 (2009), 287–317.

[23] Murali Venugopalan. 2019. Building Critical Thinking Skills Through Literature.. In *International Forum of Teaching & Studies*, Vol. 15.