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Introducing the Perspective Web

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1.1 A Web of Perspectives

It is the year 2021. The year in which the impact of digital communication resulted in a direct physical assault on the senate in Washington, DC, on January 6, now called the "Capitol Riots." An assault by people that, although spread out over the country, formed a community of believers that the presidential elections had been "stolen." Never before have we witnessed the impact of communication on our world of beliefs in such a direct and forceful way. How could this happen? How did such extreme polarization come about?

The obvious suspect here is the Internet that has revolutionized our social communication and the high-tech companies that operate it. In a decade, we changed from consumers to prosumers of information and media. As a community, we post massive amounts of information and data on the Web. Our communication has never been so intense, and it is not all gold that glitters. Hate speech, fake news, hoaxes, disinformation, misinformation, trolling, phishing, identity theft, digital bashing, among others, are all new concepts that were introduced by this new media. The digitalization of social communication has connected us but also divided us into new communities, each with their own perspective on the world. Truth has become an opinion among soul mates that meet each other in impermeable filter bubbles. The promise of the nineties that the Internet brings the information society failed. Instead of free access to knowledge and enlightenment, we find ourselves instead in a communication society with unsupported claims, lies, errors, deception, misquotes, twisting, insults, and threats. Through social media, we communicate more data in weeks back and forth than has been published in centuries. For sure, the Web is an enormous network of dynamic data. But what is this data, what does it represent, and can we understand this dynamic process with its digital traces? Can we use technology to record it, detect evolving communities and their identities,

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determine the content and form of communication and the impact? Can we distill precise communication models, explain what is observed, and even predict what will happen? These are questions that we try to address in this book. Despite the dystopian view of the Web, we cannot deny that it provides a unique opportunity for researchers with very different backgrounds to do concrete research on one of the most complex social phenomena of humanity.

1.2 The Urgency of the Perspective Web

Finally, technology created the Web but should technology also take responsibility and further develop it and support people that now partly live in a digital world? Let us consider a concrete example. The following text fragment was posted on a website laleva.org in 2015 by Brian Shilhavy, Health Impact News Editor:

According to a statement made by Dr. Anne Schuchat, the director of CDC's National Center for Immunization and Respiratory Diseases, in an Associated Press story picked up by Fox News on April 25, 2014: "There hs been no measles deaths reported in the U.S. since 2003." www.laleva.org/eng/2015/03/

The text contains a citation that takes the form of a simple statement and is attributed to an official from a US government agency. The statement itself looks like straightforward text, but there is no such thing as simple text. The publication of this quote is a complex message with many different layers of information. For a start, the quote contains a typo, which does not add to its trustworthiness. More seriously, it is partial and taken out of context. Dr. Schuchat is claiming the opposite of what is suggested in the original article in the Associated Press:

Associated Press, Author: Mike Stobbe, Published Thursday, April 24, 2014: "Wrapped into that estimate are 71 million measles cases, nearly 9 million measles hospitalizations and 57,000 measles deaths. There has been no measles deaths reported in the U.S. since 2003. 'But the way we're going, we feel it (another) is inevitable,' Schuchat said."

The statement itself is not so trivial. It is not clear in this sentence as such what the focus is: is it on the "no," on "U.S." or on "since 2003"? Without the context, this is difficult to tell. In the original text, it is clear how this statement is contrasted with the statistics at a global scale arguing that the United States is neglecting the threat. Besides neglecting the context of the quote, Brian Shilhavy clearly stresses the authority of his source both as a doctor and director of a government agency and also the authority of the medium being Associated

Press. The example shows the complexity of the communication and the slyness with which people use their skills to get the impact they want.

The vaccination debate in which this post takes part has gone on for centuries since it was first conceived. Today, during the COVID-19 pandemic, it is more actual than ever. It relates to a broader societal movement in which people do not trust the government, science, the media, and the industry (Big Pharma); they claim their right to choose their own truth with the effect that less and less people vaccinate their children. Information and knowledge are spread wildly, while passionate groups are formed through online media. The positions are relatively simple: vaccines are either good or bad, but the argumentation and information are emotional, obscure, wrong, and misleading. The language is rich, complex, and powerful, while the impact has big consequences. How can parents find the "right" information and make a decision on the vaccination of their child? How to trace and trust sources? How to separate emotion from logical arguments? How to detect false arguments? How to know what is out there, outside your bubble? How to find the stances and arguments and how to position all stakeholders around it?

We believe that researchers not only have the opportunity to analyze and study social interactions, language, communication, and their impact in the digital age, but they also have the obligation to use their insight, skills, and technology to reshape this digital media into a safer and more transparent medium. We therefore propose the notion of the Perspective Web. The Perspective Web can be seen as a function, like a night-vision, that reveals hidden traces of information and claims so that you can see who is behind them, who believes what, how it is authorized, how (un)certain sources are making their claims, how claims can be twisted, and who else shares these beliefs? Such a view on the Web and social media would make communication and information more transparent and trustworthy. The Perspective Web could help measure consistency and judge quality of information. Such a Perspective Web requires the development of technology that can digest the current jungle of information and overlay it with a structured map of argumentation, positions, and sources. Do we understand how we communicate in these online debates, which are dispersed and so dynamic? If communication is so complex and so much is unsaid, can we build software that can "read" the debate and understand it? Can technology build a Perspective Web?

1.3 What This Book Is About

In order to answer these questions, we need to bring together experts from a large variety of disciplines. This book is therefore about perspectives in many

different ways. It addresses perspectives of people on people, information, and knowledge, as expressed on the Web. People's perspectives can be modeled and tested to explain people's behavior. However, this digital variant of social interaction and communication also requires that we analyze it from different scientific perspectives. The complexity of the communication and the complexity of the social and psychological impact go hand in hand. Shannon and Beaver (Shannon, 1948) were the first to propose a model for communication. Their mathematical model distinguishes a source sending a message, a transmitter that encodes a message into a signal, a channel through which it is sent and a receiver that decodes it at a destination. It is no surprise that they were engineers from the telephone company Bell. Shannon and Beaver described three success factors for communication: (1) how accurately can the message be transmitted, (2) how precisely is the meaning "conveyed," and (3) how effectively does the received meaning affect behavior? Their model was adapted by others (Berlo, 1960; Schramm, 1954) to model person-to-person communication by distinguishing: sender, message, form, channel, and receiver.

A classic Natural Language Processing approach would consider public debates as data, mostly in text form and sometimes as a discourse, for example, a discussion on a forum, news articles, or a Twitter stream. The textual units (words, phrases, sentences, etc.) are labeled through an annotation process and language models that represent these units are fine-tuned to learn the features to predict these annotations. These labels can be emotions, relations, or attributes such as fake and offensive. Such approaches focus on the text as a signal as such without considering the communicative context, the sender, the receiver, and in some cases not even the channel. A signal-only view on debates will have a hard time grasping the full complexity and interpreting the signal deeply. It also does not consider the social relationships expressed through the process of signaling, nor group identities or relationships across dispersed signals. Finally, it lacks data on the impact on the receiver and community effects at a large scale.

If we want to capture this process in its totality, we need to take a cross-disciplinary approach that addresses the participating people, the form of their posts and blogs, the content, and the diverse media through which they are distributed. Social-psychological research targets complex sender–receiver interactions, linguistic and computational approaches describe and model the message, its form, and its meaning, whereas media analysis also takes impact of the channel into account. The channel itself is complex in this modern digital media landscape. Not only is there a plethora of devices and applications, each with their specifics, we are also dealing with a handful of tech companies

that control these channels, while the old media powers still hold on to their traditional rights on content. Meanwhile, we see politicians and governments trying to get to grips with abundant new developments hardly constrained by national borders, crafting laws and regulations of which we cannot see the effect or impact either.

1.4 The Structure of This Book

In this book, we use the idea of a Perspective Web to aggregate the state-of-the-art view from different disciplines so that we can put these works in contexts: Social Sciences, Media Studies, Computational Linguistics, and Semantic Web scientists, on a central theme with high societal relevance. The book[1] is divided into four parts. In Part I, we introduce the theoretical notions on: (1) the linguistics of argumentative language, (2) the computational linguistic approaches to model and capture this, and (3) the social-psychological concepts to understand communication. Next, we dive deeper into the matter in three subsequent parts. Part II reflects on the so-called micro, meso, and macro levels of communication impact. The micro level focuses on the written discourse, the meso level on the direct social environment, and the macro level on the larger cultural and technological factors. Whereas Part II mainly considers communication as a social-psychological phenomenon, Part III looks at the online mediation process. This mediation process is analyzed in different dimensions, ranging from source encodings, channel politics, and technicalities, to content, form, and perception. The final chapter discusses quality of interaction in a computational environment, taking a more applied perspective. Part IV of the book is more technical, as it discusses how to model structures and interpretation computationally. For a start, Natural Language Processing techniques can be used to detect various properties of posted texts, including their argumentative structure, their sources, and their views on claims. Such an analysis can be used to organize claims into camps and provide a more comprehensive and less biased overview. In addition to interpreting expressions in text, we also need to model these claims as beliefs of sources (people) in formal models that can be used to reason over the implications. Whereas text is a message or signal that can be repeated many times whether confirmed or denied, these formal models condense the content of the message to their semantics. Finally, Part IV ends with two chapters that discuss how Natural Language Processing can

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[1] This book is the outcome of a Lorentz-workshop https://nias-lorentz.nl/previous-ssh-workshops/ that was organised in 2017. At this workshop, international researchers from many different disciplines discussed the idea of the Perspective Web.

be used within common applications we use daily in order to mitigate some of its negative impact. In the final chapter, we present a future perspective on Natural Language Processing as a core technology that will play a central role in various dystopic and utopic scenarios of the near future. We hope that this books inspires researchers to collaborate more across disciplines so that we not only have a better understanding of what is going on on social media and digitalized communication but also will be able to find solutions and answers to the deficits of this platform.

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