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Keynote Speaker II

Biomedical Engineering Research in the Social Network Analysis Era: Stance Classification for Analysis of Hoax Medical News in Social Media

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Abstract

Biomedical engineering research trend can be healthcare models with unobtrusive smart systems for monitoring vital signs and physical activity. Detecting infant facial cry because of inability to communicate pain, recognizing facial emotion to understand dysfunction mechanisms through micro expression or transform captured human expression with motion device into three-dimensional objects are some of the applied systems. Nowadays, collaborated with biomedical research, mining and analyzing social network can improve public and private health care sectors as well such as research health news shared on social media about pharmaceutical drugs, pandemics, or viral outbreaks. Due to the vast amount of shared news, there is an urgency to select and filter information to prevent the spread of hoax or fake news. We explored in depth some steps to classify hoaxes written as news articles. This discussion also encourages on how technologies of social network analysis could be used to make new kinds improvement in health care sectors. Then close with a description of limitless future possibilities of biomedical engineering research in social media.

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1. Introduction

Biomedical engineering research is multidisciplinary works, which commonly related to medical devices used for improving the quality of life. It merges scientific and engineering fields such as nanotechnology, stem cell as regenerative medicine, biomechanics, and biomedical devices for helping diagnostics and therapeutics [1]. As an example, nanoparticles or nanomaterials can be used in diagnostic applications such as gene therapy or bioimaging in the brain. Some of the applied systems within biomedical engineering research [2] are detecting infant facial cry to help to communicate pain [3] and lip feature extracting on the frontal face for speech training of the deaf [4]. Another work is recognizing facial emotion to understand dysfunction mechanisms through micro expression or transform captured human expression with motion device into three-dimensional objects [5]. Those works use image-based data in unobtrusive smart systems for healthcare related models. A recent trend is not only about images but also about textual data in healthcare related models such as fake news or hoax spreading within the power of internet technology.

Fake news or hoax has many definitions such as recurrent issues used as a political weapon, irrelevant truths (post-truths) or intentionally spreading falsehood information (alt-facts) [6]. Alternative facts (alt-facts) are information with no basis in reality while post-truths are defined as beyond the truths or irrelevant information. This discussion has a focus on fake news or hoax in Indonesia [7] in the form of alt-facts [8] especially about medical related issues [9]. Conducted surveys in Indonesia gave perceptions about hoaxes, how they are spread, their topic classifications and their effects on the communities. The medium of communication for hoaxes is varied like image or video such that manipulating non-textual content becomes another problem. Meanwhile, text-based hoaxes are usually spread through social media like Twitter or Facebook and the analysis to recognize them are not limited to the hoax text itself but also on how it is presented, by who, and in what format and context [10]. Hoax text presentation means that the analysis is about linguistic-based features because microblog text like Twitter and email text have different characteristics. The sources who are spreading hoax texts tend to have verifiability issues. Thus in the case of Twitter usage as a medium of communication for hoaxes, analysis of retweeting topology network becomes necessary. Aforementioned hoax analysis can be categorized into two major approaches: linguistic and network. Here, we discuss hoax within online news text that put more weights on the linguistic aspect [11]. Linguistic approaches concern with texts as a bag of equally significant words, syntax structure like noun and verb phrases within the texts, and semantic analysis to recognize any contradictions on other texts with the similar topics of allegedly hoax texts. As network approach, some web-based tools are used to predict and track disease outbreaks through query keyword evaluation [12].

Hoax analysis for the Indonesian language becomes interesting research as well since the government makes it as an important issue [7] [8]. Many unverified but widespread news can hinder the national policies. Hoax texts as bags of words were identified with some classifiers [13] in some conditions such as the experimented topics are general, the dataset comes from undeclared sources, and the training data needs manual label. Several selection features are implemented to filter the important words. Those limitations are understandable because of no Indonesian hoax text datasets available unlike English hoaxes or fake news datasets (http://www.fakenewschallenge.org/). However, those steps are not suitable for analyzing medically related hoax text since the article has convincing content but fabricated facts unless there is a refutation article to verify the false claim (Fig. 1, overall hoax content is showed in the left figure while the disagree texts are in the right figure). Those articles give stance position whether supporting the claims or refuting the hoaxes to evaluate the attitude expressed in the texts. For that reason, in a medical hoax classification problem, stance articles turn out to be essential.