CS 301 Technical Research Paper (9 pages) **Spring 2019**

Your longer paper will explore a computing technology and its impact upon the world. In this way you will demonstrate "an appreciation for social, legal, and ethical issues in computing, and their impact on society," and "an understanding of the responsibilities and challenges that technology poses for society, especially computing professionals."

You will write about a specific computing technology, such as deep neural networks (not merely a technological field or issue, such as artificial intelligence), while locating your topic within broader relevant ethical, social, and global contexts. You should have your own distinct thesis, making the connection between the specifics of your computing technology to its global impact and context. You will support your thesis and attendant claims with research into relevant and current peer-reviewed sources.

You may not borrow from writing you have done for another course (though you may use familiar sources); however, you may reuse and develop the contribution you have already made to your team's Media Analysis paper. The 9-page length requirement for this assignment includes the abstract, and the bibliography, but not the title page. (Course policies apply to short, late, and improperly cited materials.) This paper will be graded with a variation of the rubric used to grade the Classmate Profile, with additional weight given to correct use of technical terms and discussion of ethical, social, and global issues.

Sections of your paper should follow the following formatting and content guidelines:

Title Page

Follow the APA guidelines for using a title page, including a Running Head (Running head: TITLE OF PAPER IN CAPS see https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html) and a page number (on every subsequent page, only the TITLE OF PAPER IN CAPS and page number will appear). Centered, about a third of the way down the page, include your title (in regular capitalization), your name, and your university.

Abstract

Include a brief abstract following these guidelines from OWL at Purdue:

- On the first line of the abstract page, center the word "Abstract" (no bold, formatting, italics, underlining, or quotation marks).
- Beginning with the next line, write a concise summary of the key points of your research. (Do not indent.) Your abstract should contain at least your research topic, your claims (thesis), your methods of support for those claims (sources), and your conclusions. You may also include possible implications of your research and future work you see connected with your findings.
- Your abstract should be a single paragraph double-spaced. Your abstract should be between 150 and 250 words (owl.english.purdue.edu). The abstract should clearly identify the main point of your paper, including the thesis, most important contributions, and conclusions.

All of the most important aspects of your paper should make their way into the abstract; do not save any surprises for the main paper. Begin a new page. Your abstract page should already include the page header (described above).

Sections with APA Headings

You will organize your long paper into sections, and subsections, each of which is likely to have more than one paragraph (do not forget to give transitions between paragraphs AND section/subsections). Use headings to mark off the sections of your paper using APA format:

1 (1st level after title) **Centered, Boldface, Uppercase and Lowercase Headings**

2 **Left-aligned, Boldface, Uppercase and Lowercase Heading**

3 **Indented, boldface, lowercase heading with a period.** Begin body text after the period.

4 ***Indented, boldface, italicized, lowercase heading with a period.*** Begin body text after the period.

5 *Indented, italicized, lowercase heading with a period.* Begin body text after the period.

You will likely only use the 1st and 2nd levels of heading above.

1. Introduction. The introduction should start broadly by identifying and describing the area your paper addresses. Remember the five elements of a successful introduction. You should have a "hook," but do not get too cute, hyperbolic, or clichéd; keep it simple. The introduction should move quickly from a brief mention of the broad topic to the more specific focus of your paper. After a few sentences that narrow your focus, add your carefully worded thesis statement. The thesis statement (with a limited subject and point-of-view) should be contestable so that it can be defended, demonstrated, or proven in the remainder of the paper. Offer a preview, a brief sketch or outline of your argument, and then include a few transitional sentences to actually introduce the next section of your paper. The entire introduction should use **two-thirds to one page.**

2. Background. This section is a more elaborate preview that lays the groundwork for the technical details and social analysis that you will provide later in your paper. Here, you will define and describe the basic concepts of your chosen technology (such as blockchains, orphans, and encryption if your topic is related to the cryptocurrency Ethereum). Secondly, you should discuss the social impact of your technology, merely mentioning some of the social concerns (of switching over from fiat currencies to cryptocurrencies, for example) Keep this section brief, only touching upon the important aspects that you will come back to later in the paper. Cite background sources appropriately. Your background section therefore consists of a description of the technology and its important impact on the world, and a description of the area of societal impact that you focus on, but not the specific details or moral imperatives of that impact … not yet. The background material is here laid out so that your reader can follow the detailed proof of your thesis. The background section should fill **approximately 1 page.**

3. Precedents and Related Work. You should draw analogies between the ethical and social challenges of your technology and those of historical precedents (such as Bitcoin),

or current similar technologies (such as IBM's Hyperledger). Or, if you are focused in on deep neural networks (a type of AI), then you can talk about basic pattern recognition algorithms as precursors, or about current technologies such as evolutionary algorithms. You should give some technical detail here as well as mention a few social concerns about this precedent or related work so as to prepare the reader for the full exploration of your chosen technology (Ethereum or deep neural networks) in the following pages of research. Your Precedents and Related Work section should fill **at least ⅔ to 1 page.**

4. Support. The main portion of your paper will depend on your topic and content. Organize it according to your argument. Organize the support into two main subsections, delineating important components of your argument: the technical details of your technology (the very small), and the social impact of that technology (the very large). Think of the different methods of supporting an argument:

- Technical details of your technology require the use of sources (peer-reviewed sources). This inductive argumentative method uses "examples" to make a proof, using testimony (of experts – found in journals), statistics, polls, and the details you have collected about your chosen comparable precedents. **You must use at least 3 peer-reviewed sources, one TED talks (or authoritative website on the topic), and one IEEE Spectrum Magazine or Communications of the ACM magazine article. Each source must be overtly introduced, summarized, paraphrased, and quoted somewhere within the text of your paper.**
- Social impact of your technology requires deductive arguments, using "reasoning"— drawing from established principles, those at work in precedents, laws, and mathematical truths — to make make claims that build from one to the next (syllogisms are the units of deduction - ex. If A>B and B>C, then A>C). Ethical arguments usually take this form. Discuss social concerns of your technology and make deductions that explain and evaluate relevant ethical arguments with explicit reference to the ethicists we have discussed or others.

The Support section of your paper should fill at least **4 pages of your paper**.

5. Conclusion/summary. In this section, include the five things that belong in a conclusion: After a brief transition to the language of an overview, you must summarize the highlights of your argument, ideally using different wording than you use in the abstract and introduction, and your thesis, which can now be stated more emphatically. The Conclusion/Summary should include possible implications of your work, **especially for computer professionals (you must overtly mention their responsibilities)**. Identify other related topics for research without trying to address or solve them. Pose interesting questions or concerns to provide another contextual marker, a last "reverse hook" to your paper. All of this should consume only a paragraph or two, at least **1 page**.

6. Bibliography. Give APA style end-of-text citations for your sources on a page that begins with the title "References." For this assignment, acceptable sources include TED talks, your textbook, authoritative websites, and journal articles (peer-reviewed sources), but you are required to have 3 peer-reviewed sources, likely to be articles found through the Subject Guide (left-hand side of our Blackboard page), or directly through the library

website's links to ACM Digital Library, Applied Science & Technology Source, CiteSeer, IEEE Xplore, SpringerLink, or Google Scholar (this last tool can lead you to articles, but you will likely have to find them again through the library links in order to get them for free). Note that conference papers of the last five years are acceptable as peer-reviewed sources because of the speed of development in the fields of computing. In-text citations must appear throughout your paper with enough regularity that your reader can know precisely which ideas are yours (remember: you are only allowed to use first person only very sparingly and only in the abstract).

Grading

All course penalties and policies apply to lateness, illegitimate paraphrasing, and shortness of work. Missing sections will also incur additional penalties. Our grading rubric will be as follows:

I. Beginning Sections [25 points]
    a. Abstract [5 points]
    b. Introduction (5 parts) [5 points]
    c. Strong Thesis [5 points]
    d. Background [5 points]
    e. Precedents and Related Work [5 points]
II. Support [25 points]
    a. Integration of Sources (Induction) [5 points]
    b. Deductive Reasoning [5 points]
    c. Technical Detail [10 points]
    d. Correct Technical Language [5 points]
III. Organization [15 points]
    a. Paragraphing (within sections) [5 points]
    b. Transitions [5 points]
    d. Conclusion (5 parts with role of computer professional in 4th part) [5 points]
IV. Writing [15 points]
    a. Tense, Active Voice and Verbs [5 points]
    b. Efficiency, Clarity, and Formality [5 points]
    c. Mechanics: Grammar, Spelling, Attention to Detail [5 points]
V. APA Documentation and Format [20 points]
    a. Paper Formatting (title page, headers, headings) [5 points]
    b. In-text Citations [5 points]
    c. Annotated Bibliography (earlier submission) [5 points]
    d. Bibliography (References page) [5 points]