

## CSC 450, Senior Research Research Article Rubric

Your *research* article must describe an investigation in the area of computer science that is centered around a specific hypothesis that you will test or an objective that you will meet by designing a study, collecting and analyzing data, and drawing conclusions using an appropriate and reproducible methodology. You may also develop a research tool that has an educational or research-related purpose, but software development projects are not acceptable as research projects. Your investigation and article must meet the standards of a computer science or scientific journal.

**You must submit this assignment through Blackboard by the deadline on the due date to receive credit. The submission must be a Word document. Submissions in PDF format will not be accepted.**

**Note about grading:** Your overall grade will generally be determined using the point system below, with the following exceptions:

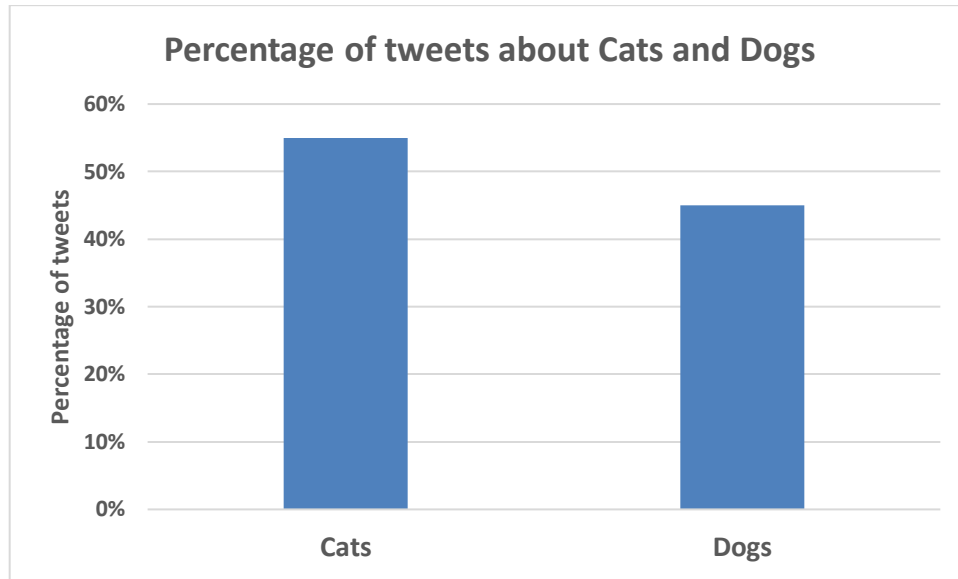
- If you receive less than a 50% on one or more components, then your paper is "unacceptable", and you will receive a D-F grade overall.
- For the *rough draft*, you will SKIP the abstract and proceed as follows (select one of the following below, though the first one is recommended):
  - Complete the Introduction (other than mentioning your results) and Methods section. *Partially* complete the Results and Discussion sections as follows:
    - The Results section should include one completed figure/table and accompanying narrative, and include at least 1 placeholder figure/table and accompanying narrative (see below).
    - The discussion should be complete with respect to your current results, limitations, and future work.
    - For all papers, use **yellow highlighting** as a placeholder where details will be filled in later.
  - You may *complete* everything except for the Discussion (this option is only used in rare cases)
- If your project involves Human Subjects Research, the online certification and consent form must be completed and turned in prior to or with the rough draft. An appropriate consent form must also be turned in at this time or prior.
- Your paper must contain a link to your Github page, which must contain current code and/or data for your project. This link must be included in the Rough Draft.

### **Note about Figure and Table captions**

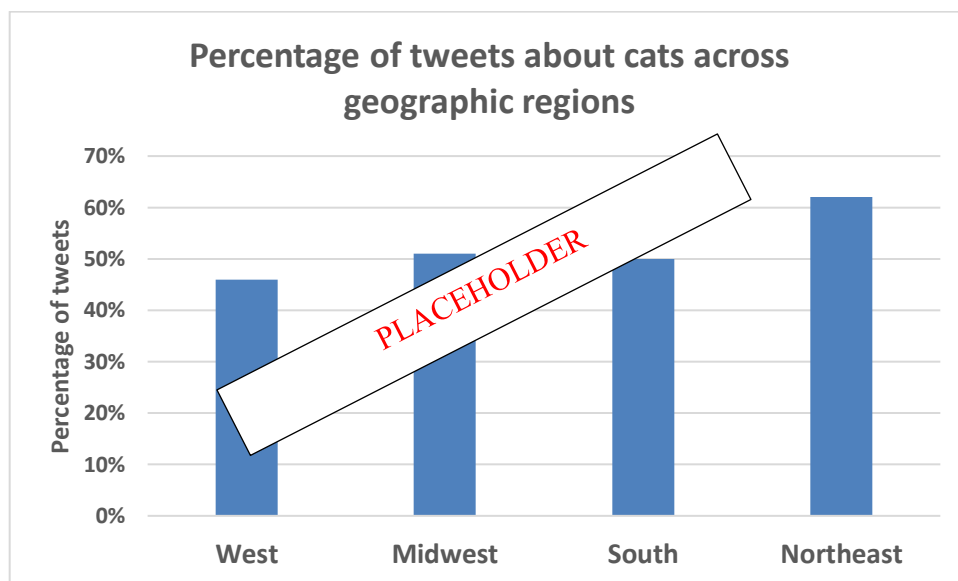
Figure captions appear *below* the figure while table captions appear *above* the table. All figures and tables are independently numbered starting with 1 (e.g. a paper can include **Fig. 1**, **Fig. 2**, **Table 1**, **Table 2**, etc). Table and figure captions *clearly* describe the information in the table or figure, and the reader should not have to refer to the main text to understand the table or figure. Tables and figures should always be centered and cited in the text (e.g., According to **Fig. 1**, ...). Table and Figure citations (e.g., **Fig. 1**) and caption labels (e.g., **Figure 1**) should be bold. Tables and figures must reflect your own work and/or own data (for pointers, see: [https://www.e-education.psu.edu/styleforstudents/c4\\_p12.html](https://www.e-education.psu.edu/styleforstudents/c4_p12.html))

*Simplified example of incomplete results section with placeholders:*

We analyzed 1,553,281 tweets from the weekend of October 24-25, of which 3.4% of tweets had keywords relevant to our study. We found that 55% of these tweets included keywords related to *cats* (e.g., cat, kitten, kitty) compared to 45% of tweets with keywords related to *dogs* (e.g., dog, puppy) (**Fig. 1**). We then analyzed whether preference for cat or dog varied across geographical regions in the United States. When we looked separately at tweets from the west, midwest, south, and northeast, we found that [results coming] (**Fig. 2**).



**Figure 1. Percentage of tweets about Cats and Dogs.** Graph shows percentages based on 1,553,281 tweets collected October 24-25 that were related to *cats* and *dogs* (see **Methods** for details).



**Figure 2. Percentage of tweets about Cats across geographic regions of the United States**

## Research Paper Rubric

**Total**                **0 ( 0%)**

---

### **Abstract**    (skip for rough draft) / 10 points

- A clear and concise summary of the research is presented in an organized manner
- The background, significance, objective, and methodology, and results are summarized
- The abstract ends with a concluding sentence about the project
- The abstract is limited to no more than 200 words

---

### **Introduction** / 15 points

- A clear and concise description of the significance and background of the project, and a summary of related work is provided, which are supported by at least 4 references, cited in IEEE format  
The objective or hypothesis is clearly stated
- The last paragraph of the introduction briefly summarizes the study and describes the results that will be presented ("In this paper, ....") (skip for rough draft)

---

### **Methodology** / 25 points

- The methodology used to carry out the project is described in sufficient detail so that it can be repeated by others.
- This section does not include background of the methods, or justification for them. Background of the methods should be described in the Introduction; justification can be described in the Results
- Appropriate statistical tests are described, if applicable.
- If the paper includes developing a model or program, only the technical aspects (programming language, computational resources) are included here; the model or program is described in the Results section.
- References to previously used methods are included, if applicable.
- A link is included to your Github project page, which includes source code and/or data collected or links to them
- Links and references to datasets used are included, if applicable

---

### **Results** / 25 points

- An unbiased presentation of the results, containing at least 2 figures/tables per group member, and a minimum of 3 figures/tables (your rough draft will include placeholders, as described above)
- Graphs and tables are properly captioned, and referenced in the paper. The captions must be descriptive.
- The text of this section points out the most important results, or trends, but does not unnecessarily repeat information in the tables or graphs.
- Enough methodological details are provided so that the reader knows how the results were generated, so this section can stand on its own.
- Details of the methodology that are not necessary for understanding the results are left to the Methods section, which is referenced, if applicable.
- In rough draft, yellow highlighting is used for place holders for what will be filled in later.

---

### **Discussion** / 25 points

- The results are put into the context of the discipline, and compared and contrasted with results from related work. (skip as appropriate for rough draft)
- The significance of and limitations of the results are discussed
- Possible extensions and future work are also discussed
- The discussion is supported by at least 4 references, cited in IEEE format
- The last paragraph summarizes the results from the paper (skip for rough draft)

## Additional Requirements

---

- **Title:** The paper has a descriptive and specific title that accurately describes the project [5 point deduction if not met]
- **References:** The paper references at least 6 **research articles** that are appropriately cited in the manuscript and included in the *References* section using IEEE format. [paper is not acceptable if it does not contain any citations or any references]
- **Format:** The paper includes a title, which is followed by the Abstract, then beginning on the next page, the Introduction, Materials & Methods, Results, Discussion, Author Contributions (if applicable), and References. All section headings are in bold. Figure and Table references and captions are bold. The paper is approximately 6 pages, with 1" margins on all sides, font size 11 or 12, Times New Roman or Arial font, and double-spaced. The paper must be submitted as an MS Word document. [up to 10 point deduction if not met]
- **Spelling and Grammar:** The paper is well-written and contains few, if any spelling mistakes or grammatical mistakes that detract from the reader's ability to understand the paper [up to 20 point deduction if not met]
- **Reproducible Research:** Relevant software and data are made available on Github or a similar public repository so that the analysis can be replicated. A link to the repository and appropriate description is included in the Methods section. Your Github page contains code and/or data from your project [up to 15 point deduction if not met]
- **Human Subjects Research (if applicable):** The online tutorial and consent form has been completed [human subjects research is not acceptable without online tutorial and consent form]
- **Revisions (final paper only):** The majority of my concerns are addressed and the majority of my suggested revisions are taken into account. Track changes is used for all changes to the paper [up to 20 point deduction if not met]

### Author contributions

GMD designed the study. AFP developed the model, performed the experiment, and collected the data. GMD analyzed the data. GMD and AFP wrote the paper.