WRITING THE ARTICLE

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Research Article – Basic Format

- Abstract: mini version of article
- Introduction
  - Background Information
  - Problem statement or hypothesis
  - Significance
- Materials and Methods
  - How was the research carried out?
  - Sufficient detail is provided so study can be repeated
    - All experiments and observational studies are explained
    - Statistical, mathematical or computational methods are explained and referenced if appropriate
    - Code and/or data are made available (e.g., on Github)
  - Description of *new* methods do not go here (these are Results)

Research Article – Basic Format

- Results
  - An unbiased presentation of the results obtained from carrying out the methods
  - Graphs and tables should be used to present results
  - If the paper describes a new method, tool, or program, that would be described here
- Discussion
  - Results are put into the context of the discipline (with respect to other published research)
  - The significance of the results are discussed (with respect to published research)
  - Limitations of the study are discussed (with respect to published research)
  - Possible extensions and future work are discussed (with respect to published research)

Outline of Hypothetical Example – GD sort vs. quick sort

- Introduction
  - Background Information
    - Sorting elements alphabetically or by value is a common problem in computer science
    - Common sorting algorithms include….
  - Problem statement, objective, or hypothesis
    - Slow sorting algorithms can slow down programs and limit analyses that depend on sorting, particularly for large datasets
    - Objective: develop a new, more efficient sorting method
  - Significance
    - The development of a faster sorting algorithm would allow for more rapid sorting of large datasets that currently cannot be sorted in a reasonable time

Outline of Hypothetical Example – GD sort vs. quick sort

- Materials and Methods
  - All sorting algorithms are implemented in C++, compiled using Microsoft Visual Studio 2019, and tested on machines running Windows 10 with a 8th Generation Intel® Core™ i3-8145U Processor.
  - For quicksort, implementation in library XXX was used
  - Sorting performed on
    - 1 billion random integers between +/- 1 billion, and repeated 1000 times.
    - 1 billion random character strings between 2 – 20 characters
  - Running times are compared using the two-sample t-test.

Outline of Hypothetical Example – GD sort vs. quick sort

- Results
  - Description of GD-sort, with Figure showing pseudocode
  - Theoretical running time of GD-sort is derived
  - Bar graphs comparing GD-sort with quick-sort, where height of bar is average running time (in ms), with standard deviation:
    - On 1 billion randomly generated numbers between -1 million and + 1 million
    - On 1 billion randomly generated character strings of sizes 2-20.
  - In both cases, GD-sort is significantly faster than quick-sort (expected)

Outline of Hypothetical Example – GD sort vs. quick sort

- Discussion
  - Summary:
    - Theoretical running time shows GD-sort has faster average running time than quicksort
    - Experimental results confirm these findings in the datasets we looked at
  - Related work
    - Multiple references indicating quicksort is 'best' or most popular
    - Quicksort has previously been improved with multiple pivots
  - Limitations / future work – It remains to be seen how
    - GD-sort performs on nearly sorted datasets (reference showing that performance of sorting methods depend on how sorted the data is)
    - Changing the selection of the pivot used in GD-sort might effect the running time, as was done for quicksort (reference)

The FB study

- Introduction
  - Background Information
    - No evidence of social contagions without direct interactions
    - Even then, many studies are observational, not experimental
    - Research suggests that exposure to happiness can be depressing
    - FB must decide what content to show or omit from a person's newsfeed
  - Problem statement or hypothesis
    - Does exposure to positive/negative posts change the emotional content of a user’s posts?
  - Significance
    - Would be first to show that emotional states can be transferred to others in the absence of direct interaction

The FB study

- Materials and Methods
  - Posts are deemed positive or negative based on Linguisitc Inquiry and Word Count software
  - Experiment:
    - Control – a proportion of posts eliminated at random
    - Treatment – a proportion of positive or negative posts were eliminated at random
- Results
  - Figure with y-axis the % of positive words, and x-axis the treatment (or control), which shows that
    - When positive posts are reduced, individuals post fewer positive words
    - When negative posts are reduced, Individuals post more negative words
  - Withdrawal effect – users viewing fewer emotional posts were less expressive

The FB study

- Discussion
  - Results contrast with other studies suggesting that viewing positive posts has an adverse effect (references for these studies)
  - First experimental evidence of emotional contagion
  - Related work
    - Description of linguistic inquiry and word count tool and studies supporting its accuracy
    - Additional FB studies -- reference to article showing FB content effects voter turnout
  - Limitations
    - Emotional content of FB posts do not necessarily reflect emotional status of the poster
    - Effect sizes (changes) are small, but
      - *many* variables effect a person's mood (include reference)
      - small effect sizes are not negligible when social networks are so large (reference to related work)