

Project 1 – Survey of an Algorithm

CS3330 Data Structures and Algorithms

Term 5 2016: May 23 – July 24

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Overview

This assignment consists of writing a research paper surveying a popular algorithm. Your paper must conform to the American Psychological Association (APA) writing style. There are many good online resources for the APA style. Your paper must use reputable scholarly references. Most Web sources such as blog, forums, and personal website are not considered reputable (do not cite or use any Wiki or Answer.com type websites). Your paper should use 11pt or 12pt font size for the main text. Other text such as figure and table labels and captions, if applicable, should be no smaller than 10pt. This assignment weighs 15% of your course grade.

A typical research paper for this assignment is about 7-10 double spaced pages (not including the cover page or reference page). Sample research papers from other classes are available in the folder named *Survey Papers* in the *Examples and Resources (for Project 1)* folder within the *Learning Activities* area in Blackboard. These papers are not perfect, but they will give you an idea on what a good research paper looks like.

An example survey paper template is also provided for download in the *Examples and Resources (for Project 1)* folder. I recommend that you use this template, but it is not required; however, your paper must include all of the required information for the assignment and must follow the APA style of writing.

I also recommend that you review all of the notes and recommendation in the *Examples and Resources (for Project 1)* area to avoid many of the common mistakes that occur in formal research writing. For example, avoid telling stories. Your paper should have a formal tone like the reputable research articles that you read; cite your sources within the main text of the paper (even for paraphrased content and ideas); and avoid using contractions and words such as “I” and “you” in formal writing; etc.

Topics

Choose one of the following algorithms areas to write about. Potential algorithm topics related to the algorithm area are included in parenthesis as examples.

1. Hashing Algorithms (e.g. SHA-3; Message Digest-5; Cryptography algorithms such as Advanced Encryption Standard, Blowfish, Elliptic curve cryptography; Digital signature algorithms; Bitcoin Mining)
2. Compression Algorithms (e.g. LZO, Data differencing, Huffman Coding)
3. String Matching (e.g. Google’s PageRank algorithm, DNA sequence algorithms, Spell checking algorithms)
4. Memory Management (e.g. Garbage Collection, Buddy Methods, Paging algorithms, Sequential-Fit Methods)
5. Greedy Algorithms (e.g. Huffman Coding)
6. Other algorithms areas. *If you would like to survey an algorithm area other than one of those listed above, you must contact me for approval prior to proceeding and submitting your paper. **Unapproved off topic papers will result in a 25% reduction in your overall score for this assignment.***

Note: If you have taken this course before, you must choose a different topic for your survey paper than the one you chose previously.

Content

I highly recommend that you use section headings in your paper. The paper must use uniform margins of 1 in. (2.54 cm) on the top, bottom, left, and right of every page. At a minimum, your paper should include the following sections:

Title Page

The title page should include the title of the paper and your name and course number. The upper right corner in the heading of each page should include the title of the paper on the left corner and the page number on the right corner. If you would like to include an abstract, it must be on a separate page after the title page. All text in the paper except for figure and table captions must be double spaced.

1. Introduction

The introduction should provide brief background information on the algorithm. It should also briefly discuss the problem that the algorithm tries to solve and provide a very brief overview on rest of the paper.

2. Origin

The origin section should identify the person or organization that initially designed or developed the algorithm. Support your finding on the origin using reference citations from books, journal articles, or conference proceedings.

3. Detailed Description

This section should describe the algorithm and provide one or two simple but specific examples that illustrate how the algorithm works. You may include additional sections (or subsections) as necessary. As an example, this section can include the follow type of information:

- a. Identify the algorithms original intension
- b. Identify the algorithms primary purpose
- c. Identify the complexity of the algorithm (i.e. its big-O)
- d. Provide a brief and simple example showing how the algorithm works. For example, a paper on data compression could discuss the details of the MD5 on LZO implementation. Walk through a couple of simple examples using a small data set to help illustrate exactly how the algorithm works. Diagrams and figures also help to get the point across.
- e. If appropriate, provide a brief description mentioning how the algorithm is different from other algorithms that solve the same or similar problem
- f. Do not include long source code listings. If you must include source code, only provide small sample snippets or pseudo-code that will help your discussion. Be sure to properly cite your sources.
- g. You must support your discussion using reference citations from books and/or journal articles within the main text of the paper.

4. Primary Uses

This section can provide the following type of information:

- a. What were the algorithms first successes?
- b. Identify any failures or short comings of the algorithm
- c. Give an example of who or what software products are currently using the algorithm
- d. Support your findings using reference citations from books and/or journal articles

5. Future Considerations

The paper must discuss future considerations for the algorithm. Explain what the literature says about it potential new uses or new areas where the algorithm is being used.

For example:

- a. Are other new algorithms being made based on this one?
- b. Or is the algorithm dead – i.e. not being used anymore for some reason?
- c. Support your findings using reference citations from books and/or journal articles.

6. Summary and Conclusion

For example:

- a. Briefly summarize what you have discussed.

References

The references section must on a separate page. All sources listed in your reference list must be cited within the main text of the paper using the proper APA citation format. The reference list should be single spaced. The second and subsequent lines of the reference must be intended to follow the APA formatting style of writing. Remember that the title of the section for APA must be “References” and not “Work Cited” as used in MLA.

- a. The references section must include a minimum of four (4) scholarly/reputable sources not including your textbook. If you use the textbook as a source, you must include four other sources.
- b. References must consist of books, journal articles, conference proceedings, which are the best type of sources. **For every three (3) references that you list, no more than one (1) reference can be from a reputable scholarly Web source. A Web source without an author’s name or a date usually indicates that the work is most likely not from a reputable source, and should not be used for this assignment. Do not cite or quote from blogs, Wiki sites, Answers.com, Stackoverflow.com, or other non-reputable/non-scholarly sources. You will not receive credit for those types of sources.**

Use these sections as a guide for the content and structure for your paper; however feel free to include additional sections that you feel are also be relevant to your topic. A Microsoft Word document template that is pre-formatted in APA format can be downloaded here:

https://www.sworps.tennessee.edu/training/APA_6_0/resources/apa_doc_templates.html

Grading Heuristics

The overall weight of the paper will be 20 points broken down as follows:

- [3 points] Grammar and spelling
- [3 points] Format of paper, APA style, and citations within the paper
- [10 points] Depth of coverage and originality
- [4 points] References (at least 4 reputable sources)

Other Notes

Note that all research papers will be automatically run through *Turnitin.com*. **No more than 20% of the content in your paper can be exact words or quoted text from various sources. Also, note that exact words from your sources must be cited.**

All sources where you received your information must be properly cited within the main text: even paraphrased material must be properly cited next to the appropriate sentences or paragraphs.

Feel free to post questions in the *Ask the Instructor* forum. You may also contact me individually by email. You may also discuss this assignment among yourselves in the Student Lounge.

Additional Resources

APA (2003). *Publication Manual of the American Psychological Association*. Washington: American Psychological Association.

NIST (n.d.). *Dictionary of Algorithms and Data Structures*. Available online at <http://www.nist.gov/dads>.

Shrunk, W., White, E.B., Angell, R. (1999). *The Elements of Style, 4th Edition*. New York: Longman

Troy University Online Library Services. Available online at <http://benning.troy.edu/library.cfm>

Bibme is a freely web based tool that will properly format your references in APA style. You can access this site at: <http://www.bibme.org/>. Remember that all of the references you list in your references section must be properly cited somewhere within the main text of your paper.