LopezMOSS: An Implementation of Measure of Software Similarity Algorithms

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Keywords—component, formatting, style, styling, insert (key words)

# Introduction

Plagiarism is an age-old problem in intellectual property law. However, the speed of data transfer and the rise of the Web has made it easier to do the act and has made detection much harder. Furthermore, adjuging someone of commiting the act turns out to be very complicated and can lead the overseer and lawyers in a legal grey area, where it is unsure whether the act violates the law. It is important to examine its definition first to attempt to solve the problem. According to a paper, actions that fall under plagiarism include: (1) turning in someone else’s work, (2) copying someone’s idea without giving credit, (3) not putting quotation marks, and (4) changing words only without changing the structure of the sentence [1].

In educational institutions, software assignments are usually subject to this form of malpractice and so it threatens the integrity of the educational process. In particular, it is subject to the first and second definitions stated above. However, given the number of students each professor must handle, and the large amount of effort required to perform ad hoc comparisons between them, there is a need for a tool that reliably detects plagiarism and can look past obsfucation, reordering, refactoring and other methods of deception [2].

The first significant solution to this problem was introduced in 1994 by an associated professor in UC Berkeley. It used *winnowing,* a local document fingerprinting algorithm that grouped grammatical tokens in groups of some number of tokens, hashed them to minimize storage space, and counted the frequency of each group using their hash value. This is directly derived from other techniques such as Karp-Rabin String Matching [3].

Fingerprinting algorithms calculate numbers (which we call fingerprints) to help identify a document. Conflicts within these numbers usually indicate that some part of a document (or segment of code in this case) is similar to another document. Better fingerprinting algorithms have since been derived from this method, but it remains that the foundation of most of them is either Karp-Rabin String Matching or *n*-gram fingerprinting [4].

This paper will present an implementation of a variation of these key fingerprinting algorithms. In particular, it showcases a version of *n-*gram fingerprinting. The implementation will also have a *graphical user interface* (GUI) that will allow its user to simply pick directories which correspond to projects.

# RELATED WORKS

There have been many attempts at solving the code plagiarism problem since its conception in 1994. The following contains a list of all such services, including some implementation details in their design.

JPlag is a web service that attempted to find similarities amongst a group of programs written in Java, Scheme, C, or C++. It processes code in two phases: (1) the programs are parsed and are effective turned into tokenized strings, then (2) it uses a method called **Greedy String Tiling**, where it tries to match substrings of each token strings to each other as much as possible [5].

Another such tool is *Parikshak* [6], which is similar to Jplag in that it uses the **Running-Kark-Rabin Greedy String Tiling** algorithm. It breaks down the program into tokens, then proceeds to group each token of size n, aptly called *n-gram representation.* It then converts these groups into corresponding numbers (each digit of which represents the type of the token). To generate a similarity score from such comparisons, it uses the **Jaccard Similarity Coefficient**, the quotient of the total number of fragments that appear in both programs and the number of fragments different between the two programs.

# METHODOLOGY

## Header

# Using the Template

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# Acknowledgment

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression “one of us (R. B. G.) thanks ...”. Instead, try “R. B. G. thanks...”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

# References

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