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SOFTWARE PLAGIARISM DETECTION

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Abstract - *With the development of internet and electronic devices, software plagiarism hasbecomeprevalentinsoftwareindustriesaswellaseducationalinstitutes, violating one's intellectual integrity. Certain techniques such as watermarking and semantics-preserving code obfuscations were introduced to tackle this issue. However, besides the need to insert additional data in the original program, code obfuscations can often destroy watermarks. Also, it was found that a sufficiently determined attacker may be able to destroy any watermark. In order to overcome these issues, birth-marking technique is proposed, which extracts a set of characteristics that uniquely identify the original program. Our work focuses on extracting birthmarks from source codes, implementing algorithms to measure the similarity between them and displaying the results on a dedicated user interface with respect to a pre-set threshold.*

Keywords- *Plagiarism, Birth-marking, Jaccard, Cosine, Dice, Reflect API, feature set*

I. Introduction

Software Plagiarism is the practice of claiming, or implying, original authorship, or incorporating the code from someone else's source code in whole or in part, into one's own, without adequate acknowledgement.

Software Plagiarism is of major concern for the software industry as well as the Academia. Finding ways to identify and combat Plagiarism is central to maintaining one's intellectual integrity, and therefore a tool to detect Software Plagiarism is required. There are different tools that detect software plagiarism using different techniques like tokenization, parameterized-matching etc. but the idea was to conquer the inefficiencies of those techniques.Our work focuses on extracting birthmarks from source codes using Reflect API, implementing algorithms to measure the similarity between them and displaying the results on a dedicated user interface with respect to a pre-set threshold.

II. Proposed System

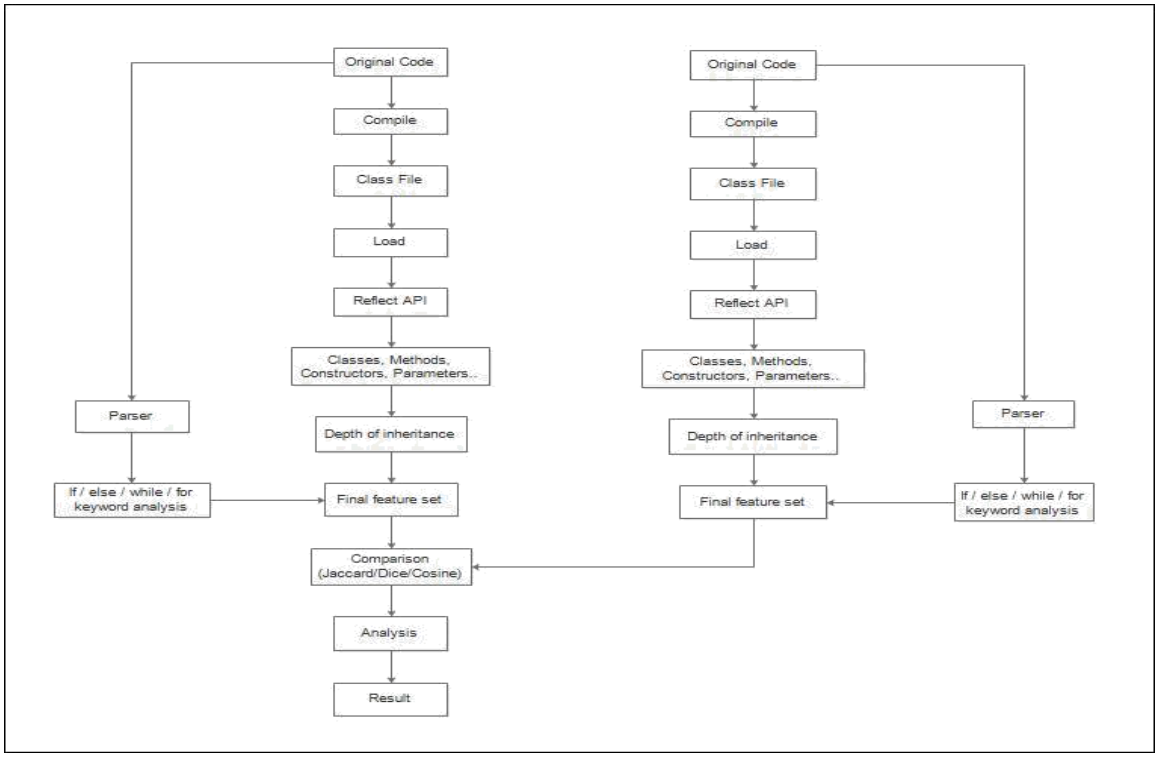
Plagiarism detection in software is a complex process, but there are tools that have lexical basis which are not that powerful, so we have designed a framework with the following salient features:

(1) Designs, loops, structures are compared instead of code

(2) Comparison follows a stepwise process according to the abstraction levels.

(3)Ratherthanjustcomparingvariableswecomparethekeywords,numberoffunctions, number of constructors, number of parameters etc.

The tool uses Reflect API of the java framework to extract certain characteristics such as number of constructors, number of functions, depth of inheritance etc. Consequently, it parses the code to find the keywords used in the software source code. A feature set is made out of the extracted characteristics and stored in the database.



The source code of the software to be checked for plagiarism is processed in the above mentioned fashion and the extracted features are compared with those in the database using algorithms Cosine, Jaccard and Dice to find the similarity.

I. Cosine Similarity

$$\text{similarity} = \cos(\theta) = \frac{\mathbf{A} \cdot \mathbf{B}}{\|\mathbf{A}\|\|\mathbf{B}\|} = \frac{\sum_{i=1}^{n} A_i B_i}{\sqrt{\sum_{i=1}^{n} A_i^2}\sqrt{\sum_{i=1}^{n} B_i^2}}$$

II. Jaccard Index

$$f(A,B) = \frac{A \cdot B}{|A|^2 + |B|^2 - A \cdot B}$$

III. Dice Coefficient

$$s_v = \frac{2|A \cdot B|}{|A|^2 + |B|^2}$$

III. Conclusion

With the growing trend of illegal code reuse, software thefts are becoming more common, compromising one's intellectual integrity. The proposed system can be used to settle the disputes of software thefts in software industries as well as in academic institutes to check the uniqueness of the software projects.

Mainly, the system computes and displays the similarity value between the source code of the software to be checked for plagiarism and those in the database. Compared to conventional systems that are used to check for plagiarism, this system proposes a different view of plagiarism detection by using utilities of java framework to extract and compare the feature sets.

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