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Title of the Article: Generation and Visualization of Static Function Call Graph for Large C Codebases

Abstract: As software systems evolve, there is a growing concern on how to manage and maintain a large codebase and fully understand all the modules present in it. Developers spend a significant amount of time analyzing dependencies before making any changes into codebases. Therefore, there is a growing need for applications which can easily make developers comprehend dependencies in large codebases. These applications must be able to analyze large codebases and must have the ability to identify all the dependencies, so that new developers can easily analyze the codebase and start making changes in short periods of time. Static analysis provides a means of analyzing dependencies in large codebases and is an important part of software development lifecycle. Static analysis has been proven to be extremely useful over the years in their ability to comprehend large codebases. Out of the many static analysis methods, this paper focuses on static function call graph (SFCG) which represents dependencies between functions in the form of a graph. This paper illustrates the feasibility of many tools which generate SFCG and locks in on Doxygen which is extremely reliant for large codebases. The paper also discusses the optimizations, issues and its corresponding solutions for Doxygen. Finally, this paper presents a way of representing SFCG which is easier to comprehend for developers.

Keywords: Static function call graph, Static analysis, Duplicate functions, Doxygen, Cytoscape.js

References:

15. F. Zhang, N. Gu, J. Su, “A Static Call Graph Construction Method Based on Simulation Execution” in IEEE 10th International Conference on Software Engineering and Service Science (ICSESS), 2019, pp. 72-76.

**Author(s):** H A Gautham, Ramakanth Kumar P

**Title of the Article:** A Systematic Approach for a Secure Authentication System

**Abstract:** Authentication is a process of verifying the credibility of a user who is trying to access classified or confidential information. There is a vast unfold in the number of internet users, and the demand for IoT devices, cloud services has been increasing; it is now essential more than ever to protect the data hosted on the internet. So, the authentication process cannot be relied on single-factor static authentication methods to verify the user credentials. All devices in the market are not equipped with biometric systems, so a form of multi-factor authentication which is independent of biometrics needs to be adopted for a secure authentication system. This paper portrays a systematic architecture to verify user credentials using specific parameters, trying to unfold patterns using machine learning algorithms based on user's past login records, thus trying to provide a safer and secure authentication process for the users.

**Keywords:** Authentication Process, Machine Learning, Multi-Factor Authentication, Security, Two-Factor Authentication, User Login.

**References:**

Author(s): Akshay Daydar

Title of the Article: Development of Effective Artificial Neural Network Model using Sequential Sensitivity Analysis and Randomized Training

Abstract: As the machine learning algorithms evolve, there is a growing need of how to train the algorithm effectively for the large data with available resources in practically less time. The paper presents an idea of developing an effective model that focuses on the implementation of sequential sensitivity analysis and randomized training approach which can be one solution to this growing need. Many researchers focused on the implementation of sensitivity analysis to eliminate the insignificant features and reduce the complexity in data selection. These sensitivity analysis methods relatively take a large time for validation through modeling and hence found impractical for large data. On the other hand, the randomized training approach was found to be the most popular approach for training the data but there is a very brief explanation available in research articles on how this training method is meaningful in getting higher accuracy. The current work focuses on the use of sequential sensitivity analysis and randomized training in an artificial neural network (ANN) for high dimensionality thermal power plant data. The sequential sensitivity analysis (SSA) technique includes the use of correlation analysis (CA), Analysis of variance (ANOVA), Akaike information criterion (AIC) in a sequential manner to reduce the validation time for all possible feature combinations. Only selected combinations are then tested against different training methods such as downward extrapolation, upward extrapolation, interpolation and randomized training in ANN. The paper also focuses on suggesting the significance of training with randomized training with comparison-based qualitative reasoning. The statistical parameters, mean square error (RMSE), Mean absolute relative difference (MARD) and R Square ($R^2$)were accessed for validation purposes. The research work mainly useful in the field of Ecommerce, Finance, industry and in facilities where large data is generated.

Keywords: Artificial Neural network, thermal power plant, correlation analysis, Analysis of variance, Akaike information criterion, training methods.

References:
Author(s): Mohit Singh, Shobha G

Title of the Article: Comparative Analysis of Hybrid Mobile App Development Frameworks

Abstract: With the rise of mobile devices and their usage, a lot of development has been made in terms of the development of applications for mobile devices. Traditionally, app development was restricted to the particular operating system, and a separate codebase was required for applications to be developed for multiple operating systems. A new paradigm of development took place in recent years which was of Hybrid app development, leading to the development of multiple frameworks which allowed for a single codebase to be used for multiple operating systems. This paper explores the features and analysis of different hybrid app development frameworks available in the market. A comprehensive analysis has been made to compare the different frameworks which are cross-platform and support web, Android, and iOS platforms. The analysis shows that all the frameworks have their merits and usage of anyone framework over others can vary from case-to-case basis. The detailed analysis of the features will bring a general conclusion over the choice of framework.

Keywords: Hybrid App Development, Cross-Platform Apps, Hybrid App Frameworks

References: