

# EFFECTIVE SOFTWARE DEVELOPMENT MODEL WITH MACHINE LEARNING

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**Abstract:** Machine learning is an innovative and novel paradigm to enhance the professional and Industrial process. It is widely used in the software development products for everyday use. It is basically used with statistical techniques to build artificial intelligent computer systems. The intelligent systems are built on machine learning algorithms which can be working from past experiences or historical data. The use of machine learning in the software development models are predominant and used in artificial intelligent applications like speech recognition and image processing or medical diagnosis systems. This paper is proposing an effective software development model developed with the algorithms of machine learning. This paper is presenting a novel model with machine learning methods and principles to develop an effective software development. The proposed model is going to benefit the software engineering methods and produce with the model driven software engineering.

**Keywords:** Machine Learning concepts – principles – software engineering- deep learning – software engineering components.

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## 1. INTRODUCTION

The increasing growth in the application usage of Artificial Intelligence with different utilities and simulation capabilities have paved the way to be utilized with greater participation in the Information Technology sector. This is widely used in the IT sector to evolve the development processes. Microsoft Corporation has identified the necessity to implement AI based application utility in all their applications of new release. Now the new paradigm has started to enforce its capabilities in all application to make the user to have easy interaction facility. If any application is developing with user interface the user should prove the identity by crossing their security credentials to access the application [2]. The advent of AI has given great ease to prove the identity with voice or image detection system. This is also providing the high level security and access to the applications. Machine learning concepts are widely implemented to initiate the methods for automatically inferring models from data. Machine learning concepts have been successfully applied in various areas of software engineering. This implementation has applied to the fields like behaviour extraction, testing, bug fixing and other areas of software engineering [4].

The main SDLC stages in predominant software life cycle models are Software Requirements, Software Design, Software Construction, Software Integration, Software Testing, Software Deployment, Software Maintenance and Software Configuration. These stages are need to be automated with the Machine Learning concepts and methods. Machine Learning is predominantly identified with the models like Numeric Parameters, Functions, Logic Formulas and Automata etc. The predominant methods identified and well in practice are supervised methods, Reinforcement methods, unsupervised methods, Semi-Supervised methods. These methods and models are need to be integrated and implemented for automation of software development life cycle stages [3].

The problems raise in software engineering are need to be addressed and automatically resolved with the implementation of Machine Learning. But the software engineering is still encounter the problems. The Root Cause of Analysis is done and found that the Deep learning concepts can give effective software development model in association with the machine learning implementation. Many software researchers and practitioners have implemented the deep learning models for the tasks of Software and got success [5].

## 2. RELATED WORK

A research study published in Springer has defined the software engineering processes, Machine Learning workflow, interviews and process maturity models. In this paper the distinct machine learning model is proposed to handle the components of software engineering processes. This paper has presented the users involved in the process of software engineering, background and demographics of software engineering. In this paper the machine learning usage for software development in association with Artificial Intelligence is described [6].

The research work published in IEEE has explored a taxonomy of software engineering challenges addressed by machine learning concepts. This paper is developed with an empirical investigation on machine learning to handle the software engineering components. In this paper the domains of software engineering and classified the engineering challenges encountered in the software development are demonstrated. This paper has proposed a taxonomy to describe the evolution of use of Machine learning components in software intensive system [4].

Du Zhang has done the research work on applying machine learning algorithms in software development. In this study the software development concepts, components, users and other aspects were discussed in detail. This paper has depicted meticulously the internal concepts of software engineering development and explicit influential concepts of software engineering development discussed at par with the automation process with the help of machine learning algorithms. This paper has described different types of application types like data mining, poorly understood domains, changing conditions in domains, feasibility, settings, conditions and convergence of software development [3].

IEEE presented an exclusive paper on deep learning in software engineering. In this paper the challenges in software engineering with open issues discussed. These issues and challenges are addressed while automating the Software Engineering components through deep learning algorithms. It has addressed the 41 tasks of software engineering with suitable solutions have been discussed. This paper also addressed the practicability concepts in utilizing the deep learning techniques in automating the software engineering [9].

The conference paper from ResearchGate has presented the machine learning for software engineering models, methods, and applications. This paper has presented all types of software applications classified and practiced in the IT industry. This paper also presented the significance of machine learning concepts and its utilities in different fields. The sphere of machine learning concepts are wide and vast to cover many issues, challenges, methods, procedures and processes of software engineering life cycle models, stages and components. This paper has identified the capability of machine learning how it works with relevance and timeliness in different categories of domains and areas. The scope and capability of machine learning are depicted with extraordinary productivity of Artificial Intelligence. This paper reading is worthy for making any automation with ML concepts [2].

## 3. RESEARCH METHODOLOGY

The research methodology is basically developed with the quantitative, qualitative research methods and Experimental research methods. The effective algorithms are need to be implemented in automating the Software Engineering with the help of machine learning models and methods. Machine learning algorithms are proven to be the best to handle minute details of the software engineering process. The domains of Software engineering are need to be understood. The database is need to be developed with the concepts of software engineering domain specific. The changing domains should be addressed with the specific solutions in software engineering and need to be streamlined in the database. The formulations of software development tasks should be addressed with the concepts of machine learning algorithms. Machine Learning are developed to address the data mining problems raised from large databases rich with valuable implicit regularities which are need to be discovered automatically.

Poor understanding of domains of software engineering process by the humans is the essence to implement the machine learning concepts with deep learning. The proposed deep learning algorithms of machine learning should be connected and implemented on the software domains which are bound to change dynamically. The machine learning algorithms should target the function from training data involved with several issues, functional representations, timing for generating the function, type of input and evaluation techniques need to be implemented suitable for the issue [9].

The deep learning algorithms of machine learning should focus on concept learning, decision trees, artificial neural networks, Bayesian belief networks, reinforcement learning, genetic algorithms, genetic programming, instance based learning, analytical learning and inductive logic programming. When the concepts are included in the machine learning algorithms it is obviously possible to handle the automation of software engineering concepts with suitable solutions [7].

#### 4. SOFTWARE DEVELOPMENT

The software development is predominantly done with different SDLC models. These models are water fall model, Spiral model, V model, Rapid Application Development Model, Agile software development model and etc. All these models are need to be described and addressed in the Machine learning concepts. All these models are predominantly configured with Requirement specifications, design, implementation, testing, deployment and maintenance. These concepts are implemented and followed in different SDLC models with distinct operational mode. Every SDLC model is configured with different sub plans. Every stage of SDLC model is implemented with various principles and concepts. Different methods are involved in implementing the stage of SDLC models. All these methods and principles are need to be loaded in the database and the machine learning concepts with distinct algorithms specialized with deep learning. The most important Machine Learning techniques offer invaluable complement o the existing repertoire of tools [4]. These tools are configured to rise to the challenge of the aforementioned demanding situations. The predominant approach is need to formulate with the help of machine learning algorithms to configure the stages of SDLC models configured with various methods, processes, procedures and approaches. The component reuse method is useful to retrieve the components from the software repository that support the software reuse. This can be possible by implementing instance based learning algorithm configured with learning problem of target function and inductive bias of software components. The machine learning algorithms like Prolog- EBG, Back-propagation, MAP, BOC, Gibbs, NBC, Candidate elimination, ID3, C4.5 assistant, prototypical GA/GP algorithms can be useful. The components explicitly defined can be handled by K-NN, LWR, CBR, SCA, FOIL inverse resolution Q and TD algorithms [6].

Software Engineering tasks like requirement engineering can be handled by AL, BBN, LL, DT, ILP learning algorithms. Rapid prototyping can be handled by GP learning algorithms. Component reuse tasks can be handled by IBL (CBR) machine learning algorithms. Cost / effort prediction tasks can be integrated by IBL (CBR), DT, BBN, ANN algorithms [3].

Most of the Software engineering special tasks like Defect prediction, test oracle generation, test data adequacy, validation and reverse engineering processes can be handled by different machine learning algorithms [8].

#### 5. EFFECTIVE MODEL

The effective model is built with the machine learning transformational programming. Transformational programming allows the software components stored in the repository represented as points in the n-dimensional Euclidean space. The information related to the components of software development methods, models, processes and procedures should be stored in the repository with the distinction of attributes with indexed and unindexed information. The indexed information should be stored in the database for retrieval purpose and unindexed information should be stored for the contextual purpose. The proposed model should generate the queries to repository to retrieve the desirable components. The desirable components should be represented as constraints on indexable attributes. The effective software development model should be configured with machine learning concepts to address the similarity measures for the nearest neighbors of software components based on the standard Euclidean distance, distance-weighted measure or symbolic measure. The proposed software development model should be included with K-Nearest Neighbor, Inductive retrieval and locally weighted regression methods. Rapid prototyping is the best method tool for better understanding and validating the components of software engineering. Evolutionary and throw-away prototyping are predominant to validate the software engineering components such as user training and system testing. Deep learning models in Machine Learning can be implemented for performing the genetic programming. The proposed effective software development model can be used as GP-based rapid prototyping to define the sets of functions available in prototype systems. It is also used to define a fitness function to be used in the prototype systems. It will be used for generating the initial program population and distinguish the selection strategies for programs in the next generation population. It is also useful for translating the returned program into a desired programming language [8].

The proposed software development model enriched with machine learning is capable to handle the concepts of Model requirements, data collection, data cleaning, data labling, feature engineering, model training, model evolution, model deployment and model monitoring concepts of machine learning. The effective model should be replicating the set of best practices for building application and platforms depending on machine learning [3].

## 6. CONCLUSION

The proposed innovative machine learning would be the model pradigm for automating the software engineering components. The machine learning is enriched with the deep learning concepts to automate the implicit and explicit components of software engineering. This paper has presented the components of software engineering. All models of software engineering life cycle have been addressed with suitable machine learning algorithms. The novel model is going to address the automation of software development engineering methods, processes, procedures and functions.

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