An Improved Approach of Design Patterns for Software Development based on Machine Learning and Data Mining Algorithm

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Abstract

Along with the computer application domain unceasing expansion, the software development needs to solve the question complex degree to inflate suddenly. In this paper, the author makes an improved approach of design patterns for software development based on machine learning and data mining algorithm. In this model, the software modifiability carries on the expression through software performance history each stage that overcame original static inspection software source code to analyse the software modifiability only to be able after the software source code to determine could obtain shortcoming. Through this life cycle model, may carry on the real-time analysis to the software modifiability. Finally, we evaluate the performance of the system by simulation and prove that it is an effective way to design patterns.

Keywords: Support vector machine, Software development, PCA model, Design pattern

1. INTRODUCTION

Along with the computer application domain unceasing expansion, as well as the people to use computer to solve each kind of the question daily dependence, the software development need to solve the question complex degree to inflate suddenly, the system scale and the order of complexity also unprecedentedly expand along with it. Due to the fierce market competition the development of the embedded system not only emphasizes to reduce development time and cost, more important is to develop high quality embedded applications. The embedded software should not only conform to the stability, error free, real-time embedded system such as requirements, as also require that the software reusability configurability and scalability, in order to improve the development efficiency and quality of embedded applications.

Software modification is often interpreted as the difficulty of modifying a module or program. Due to the potential for a chain reaction and this property is usually the software modification caused by the inconsistency between the software modules evaluation. Therefore, the modification of the module depends on the logic chain of the software module which is focused on the following aspects. (1) It can affect in the identical module to the module revision other codes, this aspect may be called is in the module limitation attribute. Here revises is refers regarding the module basic entity revision while like to variable definition or explanation revision. (2) Changes in the module are influential to other modules, the limitations of this on the one hand called modules properties. These two kinds of localization properties corresponding to the two logical chain reaction namely module chain reaction within and between modules in a chain reaction. Because the standard terms of an agreement and the design limited the module to entrust with heavy responsibility the nature seriously, therefore urgent needed to develop a core formalized development frame. This frame defined has been possible to use for to develop the embedded application procedure the module terms of an agreement, these modules might entrust with heavy responsibility. Considered the present majority of embedded systems mainly are the control and the supervisory system, realizes this frame method is correctly utilizes in the control engineering domain the decomposition principle to come the standard these software module, but is not only depends on development personnel's experience intuition to develop these modules.

The above method already obtained some kind of degree realization in some industry software, but the degree was on the other hand low. Software architecture is a collection of the programs, modules or systems and other components, including component definition and interaction between components, component structure and the constraints. In addition to describing the system architecture and topology, the software architecture also reflects the system requirements and components of the basic corresponding relationship, which provides some guidelines for the system design while in the software architecture design to consider the system-level issues, typical capacity, throughput, consistency, component compatibility and so on.
2. THE DATA MINING MODELS REVIEW

The integration of ontology and context knowledge in the process of data mining is now obvious to improve the data mining effect. At home and abroad is also a lack of related research. To solve this problem, this paper presents a data mining method that integrates ontology and the context knowledge in data mining process, which takes into the account data semantics and data application environment can further improve the accuracy of data mining. The rough set can effectively eliminate the redundant information of the system, and can also classify the relevant rules in the information system without the prior knowledge and the theory of evidence not only provides a quantitative description of the general rules, but also does not require a priori probability when the knowledge is synthesized. Therefore, these two methods can form a strong complementary role. In this paper, rough sets and evidence theory are combined which give full play to the complementarity of the two.

First carries on the reduction through the thick collection theory to the policy-making table to obtain the policy-making rule; Next, to passes through the policy-making table which the rough collection theory reduction obtains to carry on numerical processing, thus construction evidence burnt Yuan space; Finally, carries on the evidence burnt Yuan space using the synthesis rule the fusion to obtain the fusion result. The computed result indicated that, this article proposed the rough collection and the evidence theory unifies data mining method, not only refinement decision-making rule, moreover has given the decision system rule quota description. We can say, ontology provides generalization knowledge and context provides a special case of knowledge. Ontology is the foundation, the context is extended. Established on the concept of ontology by extracting the basic elements of context, due to the context in many core scenes, description (cut is formalized description) context is always a problem: the second. Because of the uncertainty of the environment that can't be end to see every characteristic application scenario, data or information provider won't provide all uncertainties in advance demand. Therefore, in terms of the context to set up and said need to provide kind of since the incremental steps modeling method. The development of knowledge base can be written in artificial intelligence language, which is mainly to give full play to the advantages of the artificial intelligence language in the backtracking and table processing, the knowledge base logical reasoning function is strong, but the efficiency of the knowledge base is low. Because that knowledge base supporting data mining does not need strong reasoning and explanation, this paper discusses how to implement it on relational database so that knowledge can be managed by the mature database management technology. Rule table attributes include rules and the rules of the rules after and before, credibility and rule type. "Rule type" indicates which rules are the rules of the relationship between attributes or yuans or heuristic rules. If the heuristic rules for rules, before "rules" and "rule" respectively before and after parts of heuristic rules; If the rules for attribute or yuans rules, rules of relations between the two attribute values is just a number before and after a number of rules, the rules to combine conditions table to find rules before or after the content. The spatial distribution of the data is often non-stationary, that is, the attribute values of the trajectory data do not vary uniformly in space, and may even show completely different statistical properties in the local space of the same road. Therefore, it is easy to generate large errors when the original data are directly analyzed by statistical methods, especially in the case of high spatial non-stationarity, which often leads to the difference of traits with characteristic significance. It is difficult to excavate the potential common behavior in the mass trajectory data. Under this basis, we will review the models from different aspects.

Principal component analysis method because of its ideological dimension reduction and that multi-index evaluation index was very close to ordering requirements, in recent years, more likely to be used in areas such as sociology, economics and management evaluation, gradually become unique multi-index evaluation technology.
PCA mainly arises from the following motivations: it is desirable to design a transformation that transforms the data set into an “effective” feature component with fewer dimensions without reducing the intrinsic information content of the original data. PCA is called maximum linear principal component analysis (PCA) when only the firstly active component is intercepted. PCA theory can be applied to data mining, information compression, the image coding as well as general recognition and many other areas as the figure 2.

![Figure 2. The Paradigm for the PCA Model](image)

Lasso method with the absolute value of model coefficients drawing number as a punishment to compress model coefficient, the absolute value automatically compressed smaller coefficient is zero and so as to achieve significant variable selection and at the same time corresponding parameter estimates. Compared with the basic traditional model selection method, Lasso method has forecast of high precision and strong interpretability of the model, and the advantages of simple calculation, therefore, the method is received great attention in the field of statistics. In recent years, the Lasso method research is quite active and a series of the valuable results are obtained and in the following formula one, we define the vector to be considered.

\[
v = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_M \end{bmatrix}
\]

Because the general principal component is difficult to explain, especially the principal component outside the first principal component, this often brings great inconvenience to the practical problem. Because, in dealing with practical problems, often not only extract the first principal component, and the principal component is difficult to explain, which makes using principal component analysis method to deal with some of the practical problems, often only give statistical interpretation of the data, the corresponding interpretation of the practical sense, such as the use of principal component analysis to do a comprehensive evaluation of the sample sorting, this is a very difficult problem which can be demonstrated as formula 2~3.

\[
R^2 = 1 - \frac{\sum_{i=1}^{N} (y_i^2 - \hat{y}_i^2)^2}{\sum_{i=1}^{N} (y_i^2 - \text{mean}(y_i^2))^2} \tag{2}
\]

\[
\hat{\mu}_i = \frac{\sum_{i=1}^{N} p(\mu_i | \lambda_i) \hat{\lambda}_i + \frac{\tau}{\tau + \sum_{i=1}^{N} p(\lambda_i | \mu_i) \lambda_i \mu_i}}{\tau + \sum_{i=1}^{N} p(\lambda_i | \mu_i) \lambda_i} \tag{3}
\]

Where the \(y_i^2 - \text{mean}(y_i^2)\) is the main term to be considered, \(\frac{\tau}{\tau + \sum_{i=1}^{N} p(\lambda_i | \mu_i) \lambda_i}\) is the evaluation term that will help to modify the model architecture. Inspired by Lasso, Jolliffe, directly to the Lasso penalty rate components, thereby automatically principal components depend on the choice of original variables, and the corresponding algorithm are put forward, such as Zou h. directly to solve the problem of the principal component regression problem into a Lasso, so sparse principal component of the solution is effectively transformed into linear model.
of variable selection problem, on the basis of an elastic net punishment structure again and then put forward the sparse principal component. To this end, all as thoughts of Lasso can be directly applied to the sparse principal component. Zass R in order to make the explanation is more convenient, and puts forward the concept of non-negative sparse principal component directly, but given the algorithm is more complex, not well to punish the value of the parameter is given as the follows.

\[ K (\Phi_j, \Phi_i) \leq \sum_{r=1}^{r} (\mathbf{v}_r^j / \mathbf{v}_r^i)' (\mathbf{v}_r^j / \mathbf{v}_r^i) = \mathbf{v}_r^j : \mathbf{v}_r^i, \]  \hspace{1cm} (4)

Where the \((\mathbf{v}_r^j / \mathbf{v}_r^i)\) represents the judging term, it can be found that the characteristic equation of the functional principal component is similar to the characteristic equation of the multivariate principal component except that the function is not a vector but the number of the observed variables in a multivariate analysis determines the number of eigenvalues and eigenvectors \(\lambda\), but the dimensionality of the functional principal component analysis is infinite. The number of observables determines the rank of the covariance operator as \(N - 1\), so the non-zero eigenvalues of the characteristic equation are at most \(N - 1\).

\[ f (\mathbf{x}) = \sum_{i=1}^{n} \alpha_i \gamma_i k (\mathbf{x}, \mathbf{z}_i) + b \] \hspace{1cm} (5)

Accordingly, in the formula 5, we show the revised model to be considered, although sparse principal component analysis method has the better statistical interpretation effect, but its extract principal component is relevant, that is sparse principal component to extract the constituent of the information overlap, and the sparse principal component extraction information often than the ordinary principal component extraction information loss, therefore, this method remains to be further improve and perfect, mainly reflected in the following aspects.

- Based on the comprehensive evaluation of the various sparse principal component than comprehensive evaluation based on principal component and the rotating principal component seems to be more reasonable, but it remains to be further confirmed.
- Jolliffe puts forward the solution to simplify the main component of the corresponding algorithm based on the Lasso, but did not give a selection method of the \(t\) value actually other sparse principal component analysis method in this problem.
- Equivalent to a regression equation of the principal component of the solution, solution of the sparse principal component is equivalent to the solution of the special punish regression. Different sparse penalty structure tends to give different solutions, therefore, can consider other sparse penalty structure based on sparse principal component.

The evaluation of support vector machine speed is proportional to the number of the support vector. While support vector machine has a certain amount of sparse, but the number of support vector along with the increase of the training sample size and rapid growth, and thus for large-scale data set, support vector function evaluation is very time-consuming. Smallest two rides hidden space support vector machines, and proved its promoted ability surpasses hidden space support vector machines, however it has not changed hidden space support vector machines not to have sparse the flaw. In order to overcome the above question, here uses slightly scale data set, support vector function evaluation is proportional to the number of the support vector, and it remains to be further confirmed.

Not only sparse hidden space support vector machines has surpassed support vector machines on sparse, moreover has with the support vector machines same promotion performance. It is the same with hidden space support vector machines, this learning machine does not have Mercer to the nuclear function to decide the condition the limit, expanded the nuclear function choice scope. Because the norm has induction sparse the essence, caused sparse hidden space support vector machines to obtain good sparse, thus might forecast the new sample effectively the function value which is reflected from the equation 6.

\[ \min \frac{1}{2} \| \omega \|^2 + C \sum_{i=1}^{n} \xi_i^+ \hspace{1cm} s.t. \begin{cases} y_i - f (\mathbf{x}_i, \omega) \leq \varepsilon + \xi_i^+ \\ f (\mathbf{x}_i, \omega) - y_i \leq \varepsilon + \xi_i^- \\ \xi_i^-, \xi_i^+ \geq 0; i = 1, ..., n \end{cases} \] \hspace{1cm} (6)

At present, already proposed the majority of increase type algorithm starting point was solves the training regulations too to be big, difficulty with uses traditional the algorithm to solve two plan questions. Their main thought is can express the training data fully based on the support vector the thought, divides the major training set which does not intersect mutually for many, first closes training support vector machines in among some sub-training regulations to obtain the corresponding support vector, then trains the support vector with the next training merge and duplicates this process unceasingly until the last sub-training regulations. Their main shortcoming is except the increase like last step, the other each step increase type process only chooses the sample, but does not have the policy-making plane information which front the use in the step obtains. And the optimization problem of the formula 6 can be transferred into formula 7.
SV support vector set, the corresponding Lagrange set by sub component zero point. If the classification problem is nonlinear, the kernel function mapping the input space to high dimensional feature space of the kernel function, the nonlinear problem into linear classification problem in high dimensional space. In the figure 3, we show the architecture of the classic SVM model.

\[
\min_{w,b,c} \left\{ \frac{1}{2} ||w||^2 + C \sum_{i=1}^{n} (\xi_i^+ + \xi_i^-) \right\} \quad (7)
\]

In order to implement in large training data set, support vector machine (SVM) algorithm, we usually using decomposition method and the incremental method. In this paper, we consider the incremental learning method. In order to select the appropriate candidate samples by KNN, we need to evaluate the confidence of the samples and find the samples with the highest confidence. In the classification problem, the confidence of the sample markers is relatively simple and can be assessed by comparing the probability that the unlabeled samples belong to different classes. However, the class label of the regression problem is a continuous real value while so it is difficult to find such an estimation probability. Here we use the evaluation mechanism in the COREG algorithm: if the sample with the highest confidence is used, the regression error of the learner trained in the labeled sample set is reduced most, that is, the sample with the highest confidence is the sample To the sample sample set to make the marked sample of the predicted value and the actual value of the sample label the most consistent.

The basic idea of the training algorithm of incremental approximation is: support vector standard support vector machine algorithm generates a set of original data is compressed, so the algorithm, the training data set can be decomposed into a training subset is loaded into memory, with one training camp training support vector machine support vector set. Then, in incremental steps, using support vector data and new data to update the current model which can be modelled as the following ones.

\[
f(x, \omega) = \sum_{j=1}^{m} \omega_j g_j (x) + b
\]

\[
R_{emp}(\omega) = \frac{1}{n} \sum_{i=1}^{n} I_{y_i} (y_i, f(x_i, \omega))
\]

\[
f(x) \leq L \sum_{i=1}^{n} (\alpha_i - \alpha_i^*) K(x, x) \quad (10)
\]

Where the \( (y_i, f(x_i, \omega)) \) is the judging term and the \( \sum_{j=1}^{m} \omega_j g_j (x) + b \) is the linear model. It can be seen that the essence of the frequency estimation operator significance is the minimum classification error of the corresponding frequency as the frequency estimation, thus the frequency estimation problem into a pattern recognition problem. Starting from the type, can use minimum mean square error criterion of estimate frequency.
\[
\frac{\partial L_p}{\partial w} = w - \sum_{i=1}^{n} (\alpha_i - \alpha_i^*) y_i \phi(x_i) = 0 \quad (11)
\]

\[
L_d = \alpha \sum_{i=1}^{n} (\alpha_i + \alpha_i^*) - \sum_{i=1}^{n} \sum_{j=1}^{n} (\alpha_i - \alpha_i^*)(\alpha_j - \alpha_j^*) \phi^T(x_i) \phi(x_j) \quad (12)
\]

For large-scale nuclear machine modeling problem, a sample data set according to the idea of the multiple model and the principle of “divide and rule”, the input sample data set is divided into several subsets according to certain principles, then set up respectively in each subset nuclear sub models of machine, the output of each model is obtained by a certain algorithm integrated again the entire output of the model from the listed items.

- How classification support vector machine (SVM) based on the principle of minimum output encoding, to make the support vector machine (SVM) traverse all categories of samples in the training, at the same time ensure that the training and test of the time.
- Each child in the distributed classification support vector machine (SVM) super parameters of support vector machine (SVM) need to select for sigma and the gamma. This paper USES the genetic algorithm has the optimal search performance parameter combination. According to the simulation model of the optimization problems, after more than direct use son classification support vector machine (SVM) classification, the result of the classification accuracy by calculation to show the fitness of individual.
- In real parameter optimization, to reduce the amount of the calculation, no need to each child binary classification support vector machine (SVM) are super parameter choice, but by the minimum output coding method of encoding and decoding process for C classification machine as a whole, the two form a multiple classification support vector machine (SVM).

Genetic algorithm is the first to face the population size N value. According to the model theory, the larger the population size, the more the genetic operators deal with the model, the greater the chance of evolution to the optimal solution, the less the risk of the algorithm falling into the local optimal solution. However, the larger the population size, the more the number of individual fitness calculation and evaluation calculation, the lower the efficiency of the algorithm. In many engineering optimization solutions the basic calculation of the objective function is very complex, each generation of the evolution of the calculation are large, it is impossible to choose a larger group size.Simulated annealing algorithm has the ability of out of local optimal solution, can be in a random search technology from the sense of the probability to find the global minimum point of the objective function. However, as a result of the simulated annealing algorithm for the whole search space don't know much about the situation, not easy to make the search process into the most promising search area, makes the operation efficiency of simulated annealing algorithm is not high as the dependence of the simulated annealing algorithm for parameter is stronger and slow evolution.

\[
\text{Entropy(individual)} = \frac{\sum_{i=1}^{N_k} \text{Entropy}(R_i)}{N_k} \quad (13)
\]

\[
\text{Rule}_{\text{consistency}}(\text{individual}) = -p_{\text{correct}} \log_2 p_{\text{correct}} - (1 - p_{\text{correct}}) \log_2 (1 - p_{\text{correct}}) \quad (14)
\]

In the formula 13–14, we show the evaluation standard, where the \( \frac{\sum_{i=1}^{N_k} \text{Entropy}(R_i)}{N_k} \) is the primary term, genetic algorithm starts from a group of randomly generated groups. Each individual in the group is a solution to the problem, which evolves in the subsequent iterations. The genetic algorithm is mainly implemented by the selection, crossover and mutation through these operations to produce a new generation of better performance of the individual, to ensure that the evolution of genetic solutions to better solutions.

- Single point crossover
- Two point crossover (Multi point crossover)

\[\text{Figure 5. The GA Demonstration}\]
Traditional theory of the global convergence of genetic algorithm based on evolutionary yuan was the premise of limited as its actual application value is not high. Mutation operator to increase the diversity of the population, but is too big or too small mutation probability will seriously affect the search process combined with the mutation direction, guidance can make the variation of individuals with low fitness to be eliminated. Therefore, how to in the limited within the population size and limited algebra, mutation operation is used to maintain the population diversity is becoming a hot spot of research. The key point of strategy is evolutionary formula of particle swarm algorithm to replace the traditional mutation operators in GA (called PSO mutation), made from the individual to the mutation operator according to the current optimum distance to automatically adjust the variation range and direction, and always let the individual blindness in the current optimal solution near complete variation to avoid the variation of population divided into multiple sub populations overlapping evolve respectively, to maintain the diversity of population and avoid the mutation operator into a local optimal solution which can be shown as the follows.

$$XB_q = \frac{\sigma}{n \times \text{sep}(Z)} = \frac{1}{n \times \text{sep}(Z)} \frac{\sum_{i=1}^{n} \sum_{p=1}^{n} u_{jp} \cdot d^2(\bar{m}_i, \bar{Z}_p)}{\sum_{p=1}^{n} d^2(\bar{m}_i, \bar{Z}_p)}$$

$$u_j = \frac{1}{\sum_{p=1}^{n} d^2(\bar{m}_i, \bar{Z}_p)}$$

3. THE DESIGN PATTERN AND DEVELOPMENT GUIDANCE

In this model, the software modifiability carries on the expression through software performance history each stage that overcome original static inspection software source code to analyse the software modifiability only to be able after the software source code to determine could obtain shortcoming. Through this life cycle model, may carry on the real-time analysis to the software modifiability. In the software demand stage that may through the analysis software demand relevance, through software orders of complexity and so on functionality which obtain the sketchy software modifiability estimate. In the software after the coding phase, you can by now with software algorithms get modifiability of general specific measures and in order to better control software maintainability in the software development process. In the process, software modifiability is approaching the real value. Therefore, for the software development process can be in early to control software modifiability, may at last get better control results or make the modifiability of software within the expected range.

Formal methods in software engineering is to rely on the mathematical model and calculation to describe and verify the behaviour and the characteristics of a target software system, including requirement specification, design and implementation, the most fundamental characteristics of formal methods is based on a rigorous mathematical foundation, if a method has a good mathematical foundation (the foundation to provide a series of concepts, such as: the precise definition of general consistency and integrity, and defines the realization and correctness), then it is formal, typical of the formal specification language is given. Formal methods can be used to solve the two semantic problems that often occur in software development that because the formal method is mainly symbolic system which should host the following features.

- The fast prototype method biggest merit is can reduce the software system greatly the later basic period maintenance cost, enables the system function to reflect the user correctly the demand. Prototype itself and this basic method deficiency lies in, if the prototype itself function establishment incomplete, the performance is not good that can cause the prototype the design and the use surpasses the anticipated expenditure and the time.
- Each object has its own characteristics and the state, the interaction between different objects and the interrelated constitute a complete set of the objective world. Problem domain by the contact between the object and the object to describe, it encapsulates data and related methods together constitute object, centering on the object and the data structure to construct the system. Due to adopt the principle of the data and function encapsulation, object-oriented method has the strong ability to adapt to changes in demand, also make the development of the system is easy to reuse.
- Process-based protocols have an obvious drawback: they pay attention to the functional decomposition of real-time systems rather than structural decomposition. In the other words, process-based software development technology is a function-centric software development technology, which emphasizes the decomposition of the system in the order to facilitate the realization of the function. This specification mainly addresses the problem of the timing analysis which leads to the final realization of the system is neither open nor easy to reconstruct while especially for some static timing process.
Embedded systems have two main types of models: (1) according to the input and output interface model code component interface, and whether or not a component of the output directly with one or more other components input directly connected; Were connected to (2) based on the object of the port by input and output ports to interact, such as through a shared memory. Model (2) is a specialized development and application in robot applications, but similar model is widely used in many applications. Based on port object provides a high degree of adaptability, but at the same time, its application is also contributing to the model is relatively complex, such as the model diagram is very chaotic, as this is because it requires clear specification application makes all ports and port connection which can be shown in the figure 6.

![Figure 6. The Software Development Pattern and Architecture Illustration](image)

The development pattern of information system based on software reuse is composed of the two parts: the development of prototype system and the development of application system. It is divided into the following three levels: requirement reuse, design reuse and component reuse.

- The purpose of this phase is to components in the field of development, including component design, coding, and testing activities, get domain reusable components, and in the field of reusable component library.
- According to the participation of users, experts in the field of the field, with the field of definition of the existing system in the field of the domain analysis activities in the field of acquiring reusable requirements, and reuse requirements in reuse demand in the library.
- According to the result of domain requirement analysis, the system design activities of the software, including the construction of specific domain software architecture and the application of the design patterns.

Since functions and classes are source-level, it is common to write components and call the client using the same programming language. For example, objects written in C++ are difficult to be invoked by Java programs, which makes functions and general classes written in one language not reusable in another language, and allows different programmers to use their familiar programming language associations writing the programs becomes difficult. And the component is binary level, so components are language-independent, constitute an application of different components can be written in different languages, when more than one collaborative development of an application system, the developer can choose according to their actual situation specific or familiar with the language tools to develop their own components. This paper describes a software development process driven model driven, support component reuse and assembly based on the model, its basic idea is to use the model driven theory and conceptual framework to guide the software development, and provides a flexible and reusable component development and assembly system to meet the needs of different applications in the field. The reason is because the introduction of component reuse application of component technology in different fields used widely at present, the industry has accumulated a lot of general applications for a wide variety of the components, the combination can improve the efficiency of software development.
Each design pattern system named interpretation and evaluation of the object-oriented system design of an important and recurring. In this way, we just to clear up these design patterns that can be completely or largely absorbed by those who contain valuable experience in the model of object-oriented system can have a better understanding. More importantly, these models can be directly used to guide the object-oriented vital object modeling problem in the system. As long as the problem have the same background, we can directly apply the design patterns, thus greatly reduce the workload of software development personnel.

![Diagram](image)

**Figure 7. The Sample Design Pattern**

Design pattern description method including natural language description law, unification mark language (UML) description law that formalized language description law. The natural language description law quite is simple, conveniently, but insufficiently is smooth to between the reality and the design transition description. The object modeling technology (OMT) description law is the use class chart and the object chart to designs in the pattern kind of, the example as well as the overall pattern structure carries on the graph description the method, but UML is further develops in the OMT foundation, its description is clearer and is unified, conforms to majority of softwares to design personnel's custom also is advantageous for designs personnel's understanding and the application which can be organized as the listed aspects.

- **Creational patterns** related to object creation, which describes how to create an object, it hide details of object creation makes the program code does not depend on the specific object. When adding a new object, therefore, almost don't need to modify the code. Create class pattern parts of the object to create the work delay to subclass, while creating object pattern to delay it to another object.
- **Structured Patterns** Handle classes or the combinations of objects, that is, how the class and object are organized to form a large structure for new functionality.
- **Existing software design patterns** are commonly used as the: (1) in the design phase of the start of the application software system design patterns on basic software architecture design; (2) of the system architecture design, after the completion of the preliminary component or general module of the system requires otherwise by joining design patterns make it more optimized, flexible. Due to the design pattern has certain complexity, so it is difficult to apply it to the specific software design, main reasons are: (1) software design personnel without correct grasp and understanding of software design patterns, (2) there is no an effective way to guide the use of these design patterns.

![Diagram](image)

**Figure 8. The Design Pattern Optimization Process based on the Proposed Methodology**
4. CONCLUSION

In this research paper, we propose the applications of the design patterns and data mining algorithms in the software development. The design pattern is refers under the specific situation, to some kind of question general solution, the performance is combination and the interactive specific way between a group of code component. In the software performance history that can met certain before in some specific situation frequently have the problem frequently which or the feeling seemed to have met before, by now might directly apply mechanically already the process confirmation solution, or referred to others mature mentality to solve, gradually, through the consummated and the documents unceasingly has formed in view of this kind of question design pattern. To this perspective, this paper proposes the new idea on the machine learning based model the performance is verified in the final part. In the future, we will conduct the robustness test.

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