

# A Simple Recommender System for Design Patterns

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## Abstract

*Since its introduction in computer science, the concept of pattern has flourished. Several conferences and workshops focus on writing and disseminating patterns. Consequently, a large number of patterns exist and it is sometimes difficult to find the right patterns and to choose among many candidate, when solving a given problem. In this paper, we introduce a simple recommender system to help user in choosing among the 23 design patterns from the GoF. We detail its implementation and discuss its application to other patterns.*

## 1 Context

Development and maintenance of object oriented systems is a major concern both in industry and research. Despite the promises of object-oriented programming, the cost of object oriented is still high and quality is a major concern.

One of the reason for current problems with quality is the difficulty to disseminate and propagate in time and space design choices. In particular, design choices include the structure of and relationships among classes.

Indeed, design choices are often scattered in the code because, with available object-oriented programming languages, they do not transcribe directly into code: developers usually must write many lines of code to implement their choices.

However, documentation, if any, is often obsolete and do not adequately transcribe these design choices. Therefore, when new developers or maintainers must work on the system, they are at loss regarding previous design choices and—worst—may inadvertently break previous choices and thus decrease quality.

## 2 Problem with Design Patterns

The problem of design choices is particularly acute with design patterns. Since their inception in 1994, design patterns have been the subject of much work and several new interesting design patterns have been proposed in the literature. This increasing number of available design patterns should lead to better quality by proposing “good” solutions to recurring design problems. However, it is difficult to follow all new patterns development and to choose the right patterns when faced with a design problem.

## 3 Recommending Design Patterns

Recommender systems are a specific type of information filtering technique that attempt to present to the user items (movies, music, books, news, web pages) of interest. The user provide the recommender system with a set of criteria and the system identify in its database items matching the criteria. Items in the database are ranked by the developers of the system or previous users for their relevance to some criteria.

We have developed a recommender systems for design patterns [1]. Our system is available on-line at <http://ptidej.dyndns.org/research/ptidej/>. Figures 1(a), 1(b), and 1(c) show the use of the system in which a user selects a set of important words related to a design problem and the system recommends the most appropriate design patterns.

The system was developed by analysing the textual descriptions of design patterns in [1] and analysing them to extract important words. Then, we associated with each design pattern sets of important words. These sets are finally compared to and ranked with respect to the set of important words selected by a user of the recommender system using a simple distance based on the cosine between the vector composed of the set

of important words for a design pattern and this of the user's query.

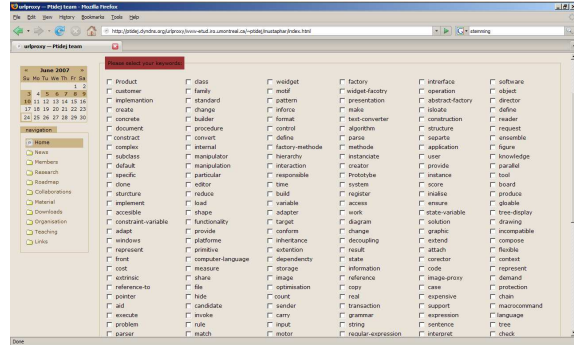
The recommender system allows novice and new developers to choose appropriate design patterns when solving recurring design problems to the extent in which these patterns exist in the system database. Thus, developers and maintainers may choose consistently the same solution to the same design problems and therefore increase the quality of their systems.

## 4 Conclusion and Future Work

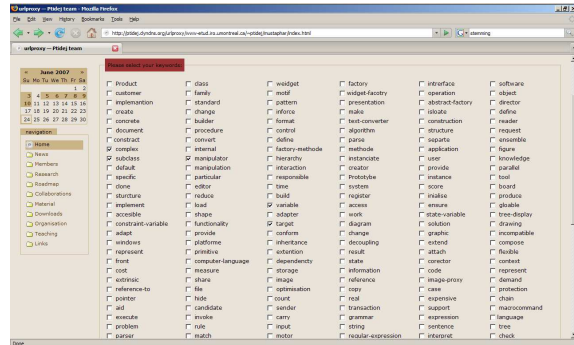
The recommender system presented is but a first prototype towards a full-fledged recommender system for design patterns. In particular, the current implementation does not use collaborative filtering and feedback from the users on the proposed design patterns. Also, we would like to improve the user interface by allowing users to enter their query using natural language rather than selecting important words. Finally, we would like to discuss with the community similar endeavours and the successes and limitations of recommender systems for design patterns. Last but not least, our recommender system must be further evaluated by real-world users.

## References

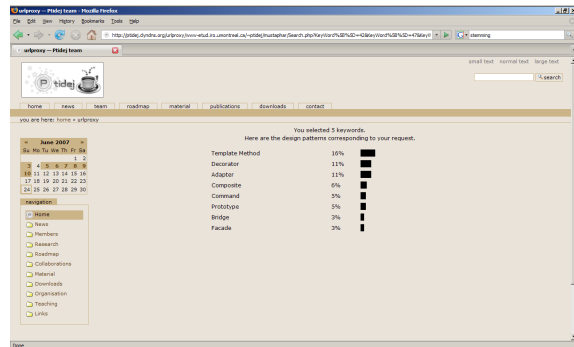
[1] E. Gamma, R. Helm, R. Johnson, and J. Vlissides. *Design Patterns – Elements of Reusable Object-Oriented Software*. Addison-Wesley, 1<sup>st</sup> edition, 1994.



(a) The Recommender System



(b) Selecting Design Problem



(c) Most Appropriate Design Patterns

Figure 1. Steps of Using the Recommender System.