ВНЗ Укоопспілки «Полтавський університет економіки і торгівлі»

Кафедра комп’ютерних наук та інформаційних технологій

КОМП’ЮТЕРНІ НАУКИ ТА ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ (КНІТ-2022)

МАТЕРІАЛИ НАУКОВО-ПРАКТИЧНОГО СЕМІНАРУ
Випуск 1

Вересень 2021 р. - червень 2022 р.

Полтава 2022

КОМП’ЮТЕРНІ НАУКИ ТА ІНФОРМАЦІЙНІ ТЕХНОЛОГІЇ (КНІТ-2022): матеріали науково-практичного семінару. Випуск 1 / за ред. Ольховської О.В. – Полтава: Кафедра КНІТ ПУЕТ, 2022. – 40 с.

Збірник матеріалів науково-практичного семінару містить добірку праць присвячених актуальній проблематиці, що висвітлює питання галузі сучасних інформаційних технологій, кібернетики, інформатики, математичного моделювання, системного аналізу, програмного забезпечення інформаційних систем та теорії прийняття оптимальних рішень.

У збірці представлено матеріали, що відображають проблематику підготовки фахівців з комп’ютерних наук та інформаційних технологій.

Ум. друк. арк. 2,5

UDC 004.42

DEVELOPMENT OF SOFTWARE SIMULATOR FOR THE PERMUTATION GENERATION ALGORITHMS OF THE DISTANCE LEARNING COURSE ELEMENTS OF COMBINATORIAL OPTIMAZATION

Sede Paul Oshioke*, Master's, Student majoring in 122 «Computer Sciences»Poltava University of Economics and Trade. sedepauloshoike@gmail.com*

Keywords: Permutation, Algorithm, Starter sets, JavaScript, Simulator

The most challenging task dealing with permutation is when the element is large. In this paper, a new algorithm for listing down all permutations for n elements is developed based on distinct starter sets. Once the starter sets are obtained, each starter set is then cycled to obtain the first half of distinct permutations. The complete list of permutations is achieved by reversing the order of the first half of permutation. The new algorithm has advantages over the other methods due to its simplicity and easy to use.

In this paper, the purpose is the development of the algorithm of the training for solving elements of combinatorial optimization problems by the means of using a simulator, the software implementation of program testing.

Thought of the Algorithm Development

The program was developed in the environment of Visual Studio Code 1.67.0. The language used was in Javascript, HTML, CSS and Bootstrap.

Client-side JavaScript is the most widely used dialect of the language. For the code to be interpreted by the browser, the script must be included in or referenced by an HTML document.

It means that a web page doesn't have to be static HTML; instead, it can include programs that interact with the user, control the browser, and dynamically generate HTML content.

Compared to typical CGI server-side scripts, the JavaScript client-side method offers numerous benefits. You could use JavaScript to check if a user has entered a valid e-mail address in a form field, for example.

When the user submits the form, the JavaScript code is executed, and only the valid entries are submitted to the Web Server.

To provide a Rich Interface to your site users, you can utilize JavaScript to incorporate features like drag-and-drop components and sliders.

Benefits of the simulator lie in the fact that, for students who live far away from any learning institutions, studying can become almost impossible unless accommodation and transport are readily available. Remote learning takes down barriers to education that are caused by distance, making it possible for anyone, anywhere to study further with the help of a computer and internet connection.

Algorithm Process

According to algorithm design and implementation, the main algorithm process is as follows:

(1) enter a permutation;

(2) take the second element of the permutation as the current figures;

(3) obtain numbers which are on the right side of and larger than the current number;

(4) if step (3) failed, take the first left one as the current number, skip to step (3);

(5) if the step (4) failed, all permutations in a generation is completed;

(6) if step (3) is successful, take the smallest number m, and exchange it with the current number; set m as the current number, continue with the following steps;

(7) sort numbers which are on the right side of the current number in the permutation Ascending; output the new permutation

The benefits or advantages of creating this simulator are:

Because of the simulator, students who live far away from any learning institutions may find it difficult to study unless accommodations and transportation are easily available.

Remote learning eliminates distance-based educational barriers, allowing anybody, anywhere to continue their education with the use of a computer and an internet connection.

It has allowed students flexible study hours after constructing the simulator: Students can study whenever they want, whether it's after work, throughout the day, or on weekends. This means that studies can be fit around daily obligations without compromising time for work, family, or study. A flexible study schedule can help students achieve their career goals while balancing many commitments, as long as they can self-motivate and stay on track.

Conclusion

This study focuses only on the permutation development of the algorithm. Since the number of permutations grows rapidly as the number of elements of the set increase, computer source codes should be written to implement the algorithm. In addition to that, the comparison between the new algorithm with the existing ones in terms of computational time and complexity needs also to be studied. Moreover, since the permutations are heavily computational as the number of elements gets larger, a parallel implementation of this algorithm should also be developed so that the computation can be performed faster.

References

1. How To Change Content With Next And Previous Button?- Access mode: https://www.pakainfo.com/next-and-previous-buttons-in-javascript-with-demo

2. David Naugler, "C# 2.0 for C++ and Java programmer: conference workshop", Journal of Computing Sciences in Colleges Vol. 22, No. 5, 2007.

3. MS .NET Framework Developer Resource, URL: http://msdn.microsoft.com/en-us/netframework

4. R. Sedgewick. Permutation Generation Methods. Computing Surveys[J], 1977, 9(2):137~164

5. Banks J., (Ed). (1998): *Handbook of Simulation*. New York: John Wiley and Sons. [State-of-the-art handbook for discrete modeling and simulation]