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| **Data Structures and Algorithms** |
| amazon |
| **Course Project Report** |

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| **School of Computer Science and Engineering**  **2021-22** |

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**1. Course and Team Details**

**1.1 Course details**

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| **Course Name** | Data Structures and Algorithms  (Theory and Lab) |
| **Course Code** | 20ECSC205 and 19ECSP201 |
| **Semester** | III |
| **Division** | D |
| **Year** | 2021-22 |
| **Instructor** | Prakash Hegade |

**1.2 Team Details**

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| --- | --- | --- |
| **Si. No.** | **Roll No.** | **Name** |
| 1. | 443 | Shrinidhi Hireraddi |
| 2. | 455 | Priya. M |
| 3. | 447 | Suma Doddamani |

**2. Introduction**

Data structure and algorithms help in understanding the nature of the problem at a deeper level and thereby a better understanding of the world. This course provides a set of techniques to the programmer for handling the data efficiently. If the programmer does not know about data structure and algorithm, they may not be able to write efficient code to handle the data.

A comprehensive knowledge of data structures in combination with algorithms is the core foundation of writing good codes. We are using data structure in everyday lives without even knowing it. From our contact list, book piles to organizing hierarchy or to-do list, we are applying different arrangement techniques which are called as data structures in the computing realm.

This project highlights the main use of data structures in real world scenario.

**3. Problem Statement**

An user shops different products from amazon. Firstly, he chooses the category and under that he chooses the products. The user selects the products from the menu and applies the filter and sorting order to display the products. Offers and discounts are also applied to the order. The order is finalized and added to the cart. The user’s address and other details are read and the order is placed.

**4. Functionalities**

|  |  |  |  |
| --- | --- | --- | --- |
| **SI. No.** | **Function Name** | **Description** | **DS and Algorithm Used** |
|  | load\_from\_file  () | Loads all the product information from the files to the data structures | Files |
|  | menu () | T displays the menu and choose categories of products | Switch |
|  | electronics () | To display and choose products from Electronic Appliances | Array of Structures |
|  | clothing () | To display and choose products from Clothing and Accessories | Array of Structures |
|  | furniture () | To display and choose products from Furniture | Array of Structures |
|  | healthcare() | To display and choose products from Healthcare and Cosmetics | Array of Structures |
|  | grocery() | To display and choose products from Grocery | Array of Structures |
|  | sports() | To display and choose products from Sports and Fitness | Array of Structures |
|  | search() | For sub-string search of product names | Sub-string search |
|  | displayCart() | To display products in the cart | Singly Linked List |
|  | addToCart() | To add products into the cart | Singly Linked List |
|  | sort\_elec1() | To sort Electronic Appliances by latest arrival | Insertion sort |
|  | sort\_elec2() | To sort Electronic Appliances by rating | Insertion sort |
|  | sort\_cloth1() | To sort Clothing and Accessories by latest arrival | Insertion sort |
|  | sort\_cloth2() | To sort Clothing and Accessories by rating | Insertion sort |
|  | sort\_furn1() | To sort furniture by latest arrival | Insertion sort |
|  | sort\_furn2() | To sort furniture by rating | Insertion sort |
|  | sort\_sport1() | To sort by Sports and Fitness latest arrival | Insertion sort |
|  | sort\_sport2() | To sort Sports and Fitness by rating | Insertion sort |
|  | sort\_heal1() | To sort Healthcare and Cosmetics by latest arrival | Insertion sort |
|  | sort\_heal 2() | To sort Healthcare and Cosmetics by rating | Insertion sort |
|  | sort\_groc1() | To sort Grocery by latest arrival | Insertion sort |
|  | sort\_groc2() | To sort Grocery by rating | Insertion sort |
|  | discount() | To apply discounts and offers | Singly Linked List |
|  | order() | To finalize order | Singly Linked List |

**5. Tools and Techniques**

**5.1 Data Structures and Algorithms**

Data structures like Array of Structures, linked list, etc. and algorithms like sub-string search, insertion sort, etc. are used.

Array of Structures is used because it is efficient for storing a set of data with certain order.

Singly Linked list is used for cart because it helps connect previous order to the current order for discounts, offers and for calculating total amount for the order.

Sub-string search algorithm is used for searching product information using the product name.

Insertion sort order is used for sorting products according to arrival and rating. It is the most suitable sorting algorithm for this scenario because of its efficiency and simplicity.

Efficiency of insertion sort is of the order n^2.

**5.2 Project Statistics**

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| --- | --- | --- |
| **Si. No.** | **Measure** | **Value** |
|  | Total Functions in Project | 25 |
|  | Total number of lines of code  (Including comments, newlines etc.) | 4107 |
|  | Number of Errors | 0 |
|  | Number of Warnings | 0 |
|  | Team Satisfaction about Project | 100 |

**6. Learning and Takeaway**

Regardless of what topics we choose, there’s always something which we learn from a wrapped project. This project gives the knowledge of how the data structures and algorithms are used in a real world scenario.

Most importantly, it helped enhance our thinking and application process for any given problem. It taught us how to understand and simplify the given problem, bring out solutions and choose the best one from them, and apply the solution to the problem.

**6.1 New knowledge**

It not only helped revise old courses but also helped learn new algorithms. We learnt new techniques and shortcuts for accomplishing the given objectives.

**6.2 A sense of accomplishment**

This project is concluded successfully and we have achieved what we set out to do. Sorting techniques, sub-string search and many other techniques are used to bring out the better output.

**6.3 Team management**

Every member in the team contributed equally to the project. We were able to manage the time efficiently and complete the project within time. Process planning and documentation development was accomplished using GitHub.

**7. References**

[1] Thomas H. Cormen, Clifford Stein, Ronald L. Rivest, and Charles E. Leiserson. 2001. Introduction to Algorithms (2nd ed.). McGraw-Hill Higher Education.

[2] lbackstrom. The Importance of Algorithms.

Link: https://www.topcoder.com/community/data-science/data-science-tutorials/the-importance-of-algorithms/. Site last accessed on: 23 October 2017.

[3] “Launching Your App on Devices”,

developer.apple.com, Retrieved(30 April, 2016)

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