CSCE 345 – Operating Systems
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Project Report
Disk Analyzer

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Introduction

A disk analyzer is an application that permits the user to picture the disk space usage (Disk Utility (n.d.)). Our project is a disk analyzer that allows the user to browse through the folders to obtain all details about the content of the directories in terms of composition (documents, music, photos,etc..), permissions(read/write/execute for user/owner/group/others), and ownership details. Moreover, our disk analyzer provides its users with the luxury of obtaining security measurements as well as disk fragmentation statistics. The attributes of this project are as follows:

1. Provide an interactive UI that escorts the user through the analysis of the disk's directories with ease
2. Grant the user with all possible features about the file/folder/directory (s)he wishes to analyze by a simple click
3. Present statistics about the disk composition in terms of content types (extensions), ownership, and content's size makeup in informative pie and bar charts

The design and features of our disk analyzer was influenced by already existing disk analyzers such as, WinDirStat and DiskAnalyzerPro.

Background

Prior to the development of the group's disk analyzer, a research has been done to inspect already existing disk analyzers. During research, the following disk analyzers have been closely speculated:

➔ WinDirStat: this software has 2 main features that are of great importance:

a. Upon start, the whole directory is read at once
b. Displays the directory in 3 different views: directory list, extensions list, and treemap (The 10 Best Free Tools to Analyze Hard Drive Space on Your Windows PC. (n.d.)).

WinDirStat's views, including the directory and extensions lists, have been utilized in our project because they provide the user with prominent details. Regardless of its convenience, WinDirStat also has its pitfalls. First, its treemap view, which shows the composition of the directory and its subdirectories in terms of colored rectangles; colors correspond to the different extensions and the rectangles' sizes correspond to the size of the file. Moreover, WinDirStat is not portable and needs installation, unlike other disk analyzers which are exe files.

➔ DiskAnalyzerPro: this Mac app provides the user with a more scrutinized overview of the directory requested compared to WinDirStat. DiskAnalyzerPro's main features include:

a. Detailed and graphical analysis of the storage, including the size, type, apps installed, oldest/largest files, date of creation, percentage on disk, and statistics based on this data.
b. Interactive GUI that includes structured tree views of the directories, pie charts of statistics, and easy-to-use tabs and options (DiskAnalyzer Pro. (n.d.)).

DiskAnalyzerPro's UI, such as its treeview, pie charts, and the kind of details we could provide the user with, helped us set a basis to build our project on. However, DiskAnalyzerPro provides some options, like deleting deleting, copying, moving, and zipping files, were, from our perspective, unnecessary for a disk analyzer and hence were not included in our implementation. Instead of those features, we prefered to provide the user with permission and ownership details.

Design and Technical Implementation

Our disk analyzer focused on merging an uncomplicated UI, which aims to serve different types of users, with a sophisticated analysis of directories, starting from the basic file aspects to the security checks. The disk analyzer was implemented using Qt.

There are two possible views from which the user can browse through the disk under analysis: grid view, which displays the folders adjacently in the form of a grid, and tree view, which lists the content of the selected directory; the user can alternate between the two views by clicking a button. The user can also skim through the folders using the arrows, which can direct the user back and forth.

When the user chooses a directory by clicking on the directory in the grid or list view, several modules work concurrently to obtain the results: name of file, size of file (or size of component files if the directory is a folder), type of file/folder, extensions of file/content files in the folder, permissions (read/write/execute) for the user/owner/group/other, and owner(s) and group(s) of file/content of folder.

All the details about the extensions of the files in the folder are displayed on a side panel. The statistics of the folder size are represented in a pie chart, which visualizes the composition of the content in terms of size (i.e. how much space do the files/folders that are inside the current directory); the chart only outlines the composition of the size of only 4 levels below the current path. The ownership details (i.e. how much of the files inside the directory are owned by each owner), however, are displayed on a bar graph that has the owner(s) on the x-axis and the number of files owned on the y-axis. Similarly, the details about the ownership per group is

displayed on a separate bar graph. The user can display each graph by choosing which graph does (s)he wants to see by choosing one of the options (Owners/Groups) on a side tab.

Please refer the folder 'Screenshots' in the GitHub repository for screenshots of the disk analyzer we developed.

Evaluation

Our final product serves to meet the following:

1. Display to the user all directories in grid and tree view to allow the user to navigate through the disk in the view more convenient to him/her.
2. Provide the user with the name, size, type, extensions, and permissions in terms of details and graphs.
3. Disk fragmentation and security checks options.

Nevertheless, our disk analyzer does not provide the user with the following:

1. Retrieving all aspects (size, content composition, permissions,etc..) of the entire disk under analysis upon starting the disk analyzer to maximize optimization
2. Creation, access, or modification date information.
3. Deleting, copying, or zipping files facility.
4. Sorting files.
5. Retrieving details about oldest and largest files or folders.

Future Work

For future development, our group will work on implementing the features that our current disk analyzer does not have such as:

1. Analyzing the entire disk upon starting the disk analyzer
2. Providing the use with more details about the disk files (date information, oldest/largest files or folders, etc..)
3. Grant the user with more auxiliary facilities such as modifying the content of folders and sorting files/folders.

Bibliography

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