

Comparative Analysis of Data Recovery Tools

Bharti Nagpal¹, Rashmi Chaudhary², Shally Garg³

¹GGSIPU, Department of Computer Science, Assistant Professor, AIAC&R, Delhi, India

^{2,3}GGSIPU, Student, CSE, AIAC&R, Delhi, India

ABSTRACT

In today's world there is a data for everything. Data has become an integral part of everyone's life. It could be an official data, personal data, student data, super mart data or whatever. Along with data, data recovery these days has become a very important part of everyday life. Data recovery comes under forensic science. Data that is either deleted or corrupted sometimes need to be recovered. For recovering of deleted data, that has been deleted accidentally or intentionally, there are many tools available in the market. In this paper we have mentioned the top five tools of data discovery.

Keywords: Deleted, Files, PhotoRec, Recuva, Restoration, TestDisk, Undeleted Plus.

1. INTRODUCTION

Data recovery is a process of extracting deleted, corrupted or damaged data from secondary storage devices, removable media or files when it cannot be recovered in normal way [6]. The data is extracted from storage devices such as hard disk, USB drives, CDs and other electronic devices [4]. Recovery may be required due to physical damage to the storage device or logical damage to the file system that prevents it from being mounted by the host operating system (OS). The most common reason for data recovery involves an operating system failure, malfunction of a storage device, accidental damage or deletion, etc. For the users, deleted files are not discoverable through a standard file manager, but that data still technically exists on the drive. In the meantime, the original file contents remain, often in a number of disconnected fragments, and may be recoverable [6]. The term "data recovery" is also used in the context of forensic applications or espionage, where data which have been encrypted or hidden, rather than damaged, are recovered [6]. The best way to recover from unexpected data loss is to be properly prepared. With one of the following tools on hand, you'll always be ready to save your data. In this paper we have described the top five tools of data recovery from which the deleted or corrupted data can be recovered.

2. RECUVA

Recuva is a user-friendly tool for the recovery of deleted files [4]. It recovers the files that are deleted permanently and space occupied by them is marked as free space by the operating system [1]. It works on windows operating system [2]. Also the files and images deleted from recycle bin are recovered using recuva. It can recover files that are deleted from iPod, by bugs, crashes or viruses. It has a simple interface that can be used easily. In this software there is an option to search the type of file like image, audio, document, video or any other file [5]. One can also set the search location on the computer to everywhere like my documents, removable media etc. Also there is a manual mode if wizard is not needed. In this tool there are three light systems to indicate how probable the recovery of files will be, and when available, it can provide previews image files available for recovery [5]. Restores all types of files, office documents, images, video, music, email, anything [7]. It supports FAT12, FAT16, FAT32, exFAT, NTFS, NTFS5, NTFS + EFS file systems [7].

3. TESTDISK

TestDisk is an open-source, command line tool for recovering data [4]. It is free of cost. TestDisk recovers accidentally deleted files from different file systems like FAT, NTFS, and ext2 [5]. It also recovers lost data storage partitions [2]. Non-booting disks are made bootable when symptoms are caused by faulty software, viruses or human error (such as accidentally erasing a partition table) [5]. TestDisk fix FAT tables, MFT, locate the ext2/ext3 backup SuperBlock, deleted files are copied from partitions to recovery media, and find lost partitions to locate data which is lost. Few of the operating systems under which TestDisk can run are DOS (either real or in a Windows 9x DOS-box), Windows (NT4, 2000, XP, 2003, Vista, 2008, Windows 7 (x86 & x64), Linux [4], FreeBSD, NetBSD, OpenBSD, SunOS and MacOS X [8]. TestDisk helps in finding lost partitions of file systems like BeFS (BeOS),BSD disklabel (FreeBSD/OpenBSD/NetBSD), CramFS, Compressed File System, DOS/Windows FAT12, FAT16 and FAT32, XBox FATX, Windows exFAT ,HFS, HFS+ and HFSX, Hierarchical File System, JFS, IBM's Journaled File System, Linux

btrfs, Linux ext2, ext3 and ext4, Linux GFS2, Linux LUKS encrypted partition, Linux RAID md 0.9/1.0/1.1/1.2, Linux Swap (versions 1 and 2), LVM and LVM2, Linux Logical Volume Manager, Mac partition map, Novell Storage Services NSS, NTFS (Windows NT/2000/XP/2003/Vista/2008/7), ReiserFS 3.5, 3.6 and, Sun Solaris i386 disklabel, Unix File System UFS and UFS2 (Sun/BSD/...), XFS, SGI's Journaled File System, Wii WBFS and Sun ZFS [8].

4. PHOTOREC

PhotoRec is a free and open source file recovery tool [5]. It is a very powerful tool for quick and safe copying of deleted files to other disk. It is designed to recover lost files [2] such as videos, documents, achieved files from hard drives, C.D and images from digital camera memory [4]. The good thing about PhotoRec is that it ignores the file system of the media which is damaged and just focus on the specified data. It is also called as the companion program of Test disk. Photo Rec and Test Disk is almost the same tool but users sometimes prefer PhotoRec as a safer alternative when deep disk recovery is not required. It dives into the disk in a safe read-only mode and ignores the partition and file system. Operating system under which it runs are DOS/Windows 9x, Windows NT 4/2000/XP/2003/Vista/2008/7, Linux, FreeBSD, NetBSD, OpenBSD, Sun Solaris, Mac OS X and can be compiled on almost every Unix system [9]. Since Photo Rec ignores file system and thus all file system can be worked by it like FAT, NTFS, ext. 2/3/4 and HFS+ [9].

5. UNDELETED PLUS

Undeleted Plus is commercial software for data recovery. It is also provided as freeware run for lengthy limited time period. Main task performed by is the recovery of files [3]. Usually it works on all windows version and also FAT and NTFS file system [4]. Probability to recover files based on the damage caused is assigned by undeleted plus. To make the recovery of file easy and faster Undeleted Plus provides few of the function like type, sorting of files, setting filters for size and time [5]. This also helps in keeping the structure of the folder intact during recovery of files. Undeleted Plus file recovery system works on very simple principle that, when a file is deleted from the system it is not lost for forever. The file is not destroyed when deleted only the space, the file has been using is made empty and available to use again. Till the time no other file uses the emptied space the file/data can still be recovered [5]. It can just scan the system and provides the details of deleted files out of which one can choose which files has to be recovered by just pressing a button. It recovers files from hard disks, USB, camera media, floppy disks and other storage devices, recovers documents, photos, videos, email, audio[10].

6. RESTORATION

Restoration is a simple and easy tool to undelete the files that were deleted or removed from recycle bin or windows [4]. The first step performed by restoration is to scan all the files that might be recovered. It also has a feature to enter the search keyword or extension in the search box [5]. It is a portable, GUI based application that has been developed by Brian Kato. It is a simple user friendly tool that does not require any installation. It works with FAT and NTFS file system and also digital camera card [5]. Recovery files from everywhere which includes images from a flash card, video files and deleted files from a USB drive.

7. COMPARISION

The tools described above have many different features. Some of the features are same for all the tools and some are different[11][12]. Comparisons of few of the common features of the tools described above have been done in the Table 1 below.

. Table 1: Comparison Table

Tools	File System		GUI	Command line	User friendly	Operating System		
	FAT	NTFS				Windows	MAC	Linux
RECUVA	✓	✓	✓	✗	✓	✓	✗	✗
PHOTOREC	✓	✓	✗	✓	✗	✓	✓	✓
TESTDISK	✓	✓	✗	✓	✗	✓	✓	✓
UNDELETED PLUS	✓	✓	✓	✗	✓	✓	✗	✗
DISTORTATION	✓	✓	✓	✗	✓	✓	✗	✗

CONCLUSION

The basic function of the tools mentioned above is to restore or recover the accidentally or intentionally deleted files from the system. The tools mentioned above are the top fine tools of file recovery. Out of five of them three are GUI based and two are command line tools. Photo Rec and Test disk is companion program. All of these tools have different working and features but the purpose is the same. The common thing about these tools is that all five of them work with both FAT, NTFS file system. In future we will try to work on the tools and find out which tool has the better performance in recovery of deleted files from the system.

REFERENCES

- [1]. <http://lifehacker.com/5237503/five-best-free-data-recovery-tools>
- [2]. https://en.wikipedia.org/wiki/List_of_data_recovery_software
- [3]. https://en.wikipedia.org/wiki/Phoenix_Technologies
- [4]. http://forensicswiki.org/wiki/Tools:Data_Recovery
- [5]. https://www.howtoforge.com/data_recovery_with_testdisk
- [6]. https://en.wikipedia.org/wiki/Data_recovery
- [7]. Ajlumah A., Al Kharj, Uddin, M.Y. , Ahamad, M.G. , “Comparison between file carving from disk drive and disk image in open source environment” In Computer and Communications Technologies (ICCCT), 2014 International Conference, Hyderabad.
- [8]. <http://www.cgsecurity.org/wiki/TestDisk>
- [9]. <http://www.cgsecurity.org/wiki/PhotoRec>
- [10]. <http://www undeleteplus.com/>
- [11]. Al Sharif, S.Al Ali, M. ; Salem, N. ; Iqbal, F. ; El Barachi, M. ; Alfandi, O., “File Recovery Functions in Digital Forensics' Software Tools” In New Technologies, Mobility and Security (NTMS), 2014 6th International Conference Dubai.
- [12]. Bora P., Savoldi, A. ; Gubian, P. ; Jungheum Park ; Sangjin Lee ; Sangjin Lee., “Recovery of Damaged Compressed Files for Digital Forensic Purposes” In Multimedia and Ubiquitous Engineering, 2008. MUE 2008. International Conference.