U.S. DEPARTMENT OF ENERGY'S
CYBERFORCE® PROGRAM

CyberForce® 101

File Types

October 2023

cyberforcecompetition@anl.gov

File Types 101

File Types

File types can be divided into four main groups. These groups are Images, Documents, Videos and Audio. There are other groups, but they are not as common. A file type dictates how data is stored. The type of file effects the size, where it can be stored, if information is compressed and more.

Images

Portable Network Graphic (PNG) uses lossless compression to store and present images. This means that when the image is compressed for easier storage, it does not lose any of its data. Because of this, PNG files are relatively large. They also have up to 16 million different colors, making them one of the best formats for storing detailed photos.

Joint Photographic Experts Group (JPG/JPEG) is very similar to PNG. The only noticeable difference is that JPEG uses lossy compression. This means that when the image is compressed into a JPEG file, some of the data is lost (it is not enough to make a noticeable difference). Losing some of the data allows the file to be compressed to a much smaller size than PNGs.

Graphics Interchange Format (GIF) can store basic images and designs. They are most well known for being able to store basic animations. GIFs have 1 byte for each pixel as well as 256 colors.

Documents

Portable Document Format (PDF) is a file type that makes a copy of a different file. This copy maintains the original formatting. Almost anything can be converted into a PDF. They can contain images,

audio, videos, links and more. Since a PDF attempts to be as close to the original file as possible, lossless compression is used.

Document (DOC) is a file type used by Microsoft Word. Unlike a PDF, a DOC can be created, added to and edited. Few file types can be converted to a DOC, but a DOC can be converted into a PDF, TXT, JPG and more.

Text Document (TXT) is a file type that only stores text. It cannot have any images, links, italics or bold text. TXT is considered to be the original file type for text. It's sparce nature means no added software is needed to read it and most systems have a built in TXT editor.

Video

MPEG-4 (MP4) can contain video, audio and text. It uses lossy compression to make it a relatively small size. This allows MP4 to be used on almost all systems and platforms. It is popular in streaming.

MOV is Apple's version of MP4. It was designed to be used by their QuickTime application. It uses different tracks to hold video, audio and text. MOV is larger than MP4 and more difficult to use. To open a MOV on a system other than QuickTime, it may have to be converted to a MP4.

Advanced Video Coding High Definition (AVCHD) was created by Sony and Panasonic to store high quality video and audio. This makes it so the files are relatively large compared to MP4 and MOV.

Audio

MPEG-4 Audio (MP4A) is Apple's variation of MP4. It stores audio files and can use either Apple Lossless Audio Codec (ALAC) or Advanced Audio Coding codec (AAC). MP4A has a relatively high bitrate, meaning it is known for its good quality. This also means that it is larger than other audio file types.

MPEG-3 (MP3) is one of the most popular ways to store an audio file. Almost all systems and devices can play MP3. It is a relatively small file because MP3 uses lossy compression. This also means that the quality is lower than other options like MP4A and WAV.

Waveform Audio File Format (WAV) stores audio files without compressing them. This means that there is little to no loss of data. It also means that the files are large. WAV is consistently rated as one of the best file types when it comes to audio quality. It is compatible with Windows, Mac, Apple, and more.

Other

Zip is a file type that contains other files. It acts as a container for multiple files at once. This container can be smaller than the files it holds. It works by compressing the files, making it quick and easy to download multiple files at once.

Tar is similar to Zip, but is mostly used in Linux. It can hold multiple files within it. The main difference between Tar and Zip is that Tar files are not compressed automatically.

Sources

- https://www.adobe.com/creativecloud/file-types/image/raster/png-file.html
- https://www.socialpilot.co/social-media-terms/what-is-jpg
- https://www.adobe.com/creativecloud/file-types/image/raster/gif-file.html
- https://www.adobe.com/acrobat/about-adobe-pdf.html#:~:text=What%20does%20PDF%20mean%3F,anyone%20who%20views%20the%20document.
- https://www.coreldraw.com/en/pages/doc-file/#:~:text=What%20is%20a%20DOC%20File,word%20processing%20application%2C%20Microsoft%20Word.
- https://www.ionos.com/digitalguide/server/configuration/txt-files/#:~:text=TXT%20is%20considered%20the%20original,and%20open%20the%20TXT%20format.
- https://www.adobe.com/creativecloud/video/hub/features/learn-about-mp4-format-videos.html

- https://www.adobe.com/creativecloud/video/hub/guides/what-is-an-mov-video.html#:~:text=MOV%20is%20a%20video%20format,same%20file%20on%20different%20tracks.
- https://recoverit.wondershare.com/video-recovery/what-is-avchd-file.html
- https://cloudinary.com/guides/video-formats/what-is-the-m4a-format-understanding-the-difference-between-m4a-mp3-and-wav#:~:text=A%20MPEG%2D4%20file%20containing,%2Donly%20MPEG%2D4%20files.