**ASSIGNMENT 4 AND 5**

**What are the advantages and disadvantages of lossless compression? Compare and contrast them with lossy compression schemes.**

**Lossless Compression**

[Lossless compression](https://en.wikipedia.org/wiki/Lossless_compression) refers to compression in which the**image is reduced without any quality loss.** Usually this is done by removing unnecessary metadata from JPEG and PNG files. RAW, BMP, GIF, and [PNG](https://optimus.keycdn.com/support/png-optimizer/) are all lossless image formats. When the file is saved it is compressed, when it is decompressed (opened) the original data is retrieved. The file data is only temporarily 'thrown away', so that the file can be transferred.

This type of compression can be applied not just to graphics but to any kind of computer data such as spreadsheets, text documents and software applications. If you need to send files as an email attachment, then you may be best to compress it first. A common format which is used to do this is the *.zip*format. It is important to note that since JPEGs are a lossy format that when using the “maximum” preset in Photoshop, this doesn’t mean it is lossless.

Some common lossless formats are: RLE, LV, ZIP file.

**Lossless Advantages and Disadvantages**

* **Advantages**: No loss of quality, slight decreases in image file sizes. Retains quality. Retains resolution. Can restore to original state.
* **Disadvantages**: Larger files than lossy. Cannot be transmitted as quickly.

**Lossy Compression**

[Lossy compression](https://en.wikipedia.org/wiki/Lossy_compression) refers to compression in which some of the datafrom the original file (JPEG) is lost. Lossy compression looks for 'redundant' pixel information, however, it permanently discards it. This means that when the file is decompressed the original data isn't retrieved. The process is irreversible, once you convert to lossy, you can’t go back. And the more you compress it, the more degradation occurs. With 50% compression applied we decreased our image file size by 90%. With 80% compression applied we decreased our image file size by 95%.

Lossy compression isn't used for data such as text based documents and software, since they need to keep all their information. Lossy is only effective with media elements that can still 'work' without all their original data. These include audio, video, images and detailed graphics for screen design (computers, TVs, projector screens). To summarize there is so much detail in a bitmap that if some of it is reduced the human eye won't notice that some of it is missing.

Some common lossy formats are: JPEG, MP3, MPEG.

**Lossy Advantages and Disadvantages**

* **Advantages**: Very small file sizes and lots of tools, plugins, and software support it. Can be transmitted quickly.
* **Disadvantages**: Quality and resolution degrades with higher ratio of compression. Can’t get original file back after compressing. Lossy formats eliminate minor frequency deviations to save space. Higher bit rate and sampling rates capture more dynamics and detail in the music. Mp3s ruin that.