

ImageMagick

Supported Formats: ImageMagick supports a wide range of image formats including RAW formats used by Canon (.CR2), Nikon (.NEF), Sony (.ARW), Fujifilm (.RAF), and Panasonic (.RW2).

EXIF Data Extraction: ImageMagick can handle EXIF data extraction, allowing you to read metadata from the images.

Language Interfaces:

- Python: **wand** library for ImageMagick (from wand.image import Image).
- Java: **im4java** library is a Java interface for ImageMagick (import org.im4java.core.ConvertCmd; import org.im4java.core.IMOperation;).

LibRaw

Supported Formats: supports the RAW formats used by popular camera manufacturers like Canon, Sony, Nikon, Fujifilm, and Panasonic, including .RAW and .NEF, among others.

EXIF Data Extraction: *does not support EXIF data extraction.*

Language Interfaces:

- Python: LibRaw provides Python bindings through **ctypes**. You can use these bindings to access LibRaw functionality in Python. (import ctypes, from ctypes.util import find_library).
- Java: **jrawio** library is a Java interface.

Comment: *For Python* you can achieve EXIF data extraction by combining LibRaw with another library specifically designed for that purpose. One common approach is to use LibRaw to decode the RAW image and then use a separate library to extract EXIF metadata from the resulting image. (Use LibRaw to decode the RAW image and obtain the uncompressed pixel data. Convert the pixel data to a standard image format (such as TIFF or JPEG) that contains EXIF metadata. Use a library like Exiv2, ExifTool, or Piexif in Python to extract EXIF metadata from the converted image file.). **For Java:** While there aren't direct Java bindings for LibRaw, you can utilize the JNI (Java Native Interface) to interface with LibRaw. Write a JNI wrapper for LibRaw to call Library functions from Java. After decoding the RAW image with LibRaw, convert it to a standard format that contains EXIF metadata. You can use Java libraries like ImageIO to handle image conversion. Once you have the converted image, use a Java library like metadata-extractor to extract EXIF metadata.

OpenCV

Supported Formats: OpenCV supports various image formats including JPEG, PNG, TIFF, BMP, GIF, and more. However, it may have limitations with specialized formats like RAW (.NEF, .CR2, etc.), where additional processing or plugins may be required for full support.

EXIF Data Extraction: OpenCV provides limited support for extracting EXIF (Exchangeable Image File Format) metadata from images.

Language Interfaces:

- Python: OpenCV provides a Python interface (cv2 module) which allows developers to leverage OpenCV functionalities within Python applications.
- Java: OpenCV also offers a Java interface which allows developers to use OpenCV functionalities within Java applications.

Comment: OpenCV itself may not provide comprehensive support for RAW image formats like .NEF, .CR2, etc. However, you can use external libraries or plugins that specialize in RAW image processing. For example, you could use libraries like LibRaw or dcrw to decode RAW images into a format that OpenCV can handle. (To get around the limitation, you can use the same thing that I described for LibRaw in the comment)

Pillow (PIL Fork) (Only for Python)

Supported Formats: Handles many image formats including JPEG, PNG, BMP, GIF, and some RAW formats (it does not support the proprietary RAW formats from cameras like Canon's .CR2, Nikon .NEF, Sony's .ARW, etc.).

EXIF Data Extraction: Pillow can read and modify EXIF data.

Language Interfaces:

- Python: **PIL** library for Pillow (from PIL import Image, ExifTags).
- Java: **does not support**.

Comment: To work around the limitation of Pillow not natively supporting RAW formats, you can use additional libraries to read and process RAW files and then convert them into a format that Pillow can handle, such as JPEG or PNG. (Read and Process RAW image using **rawpy** and Convert to a Format Supported by Pillow. Extract EXIF data from RAW image using **ExifRead**)

RawPy (Only for Python)

Supported Formats: does not support common image formats like JPEG, PNG, BMP, or GIF. It is specifically designed for reading and processing RAW image formats. (Canon (.CR2), Sony (.ARW), Nikon (.NEF), Fujifilm (.RAF), Panasonic (.RW2), etc.)

EXIF Data Extraction: Yes (Works well with EXIF data when used with additional libraries like *exifread*).

Language Interfaces:

- Python: *rawpy* library for Pillow (import rawpy, import imageio).
- Java: *does not support*.

Comment: To work with JPEG, PNG, BMP, ect. image formats in Python, you can use other libraries such as Pillow.

ExifRead (Only for Python)

Supported Formats: ExifRead supports a wide range of image formats, including JPEG, TIFF, and RAW formats like CR2 (Canon), NEF (Nikon), ARW (Sony), RAF (Fujifilm), and RW2 (Panasonic).

EXIF Data Extraction: ExifRead specializes in extracting EXIF data from images. It provides easy-to-use functions to access various EXIF tags such as camera make, model, exposure settings, GPS information, etc.

Language Interfaces:

- Python: *exifread* library for ExifRead (import exifread).
- Java: *does not support*.