

PROJECT ABSTRACT

Image Metadata Batch Editor (EXIF)

A desktop utility that parses JPEG EXIF at binary level (APP1 segment, TIFF/IFD entries), batch-edits title, artist, copyright and date-taken across images, rebuilds the EXIF segment preserving untouched tags, and exports real JPEGs — with a segment-level verify view. Built to order with source, format documentation, samples and complete viva kit.

01. Title

Image Metadata Batch Editor (EXIF)

02. Introduction / Background

Every JPEG from a camera or phone carries EXIF metadata — camera model, exposure settings, date taken — and usually empty or wrong fields for title, photographer and copyright. Photographers, project teams and archivists need to fix these across hundreds of photos, but most tools edit one image at a time or hide what they actually change in the file. This utility does batch metadata properly: it parses the JPEG's APP1/EXIF segment at the binary level (TIFF header, IFD entries, ASCII and rational tag values), displays every tag in a readable table, applies new values across all selected images, and rebuilds the EXIF segment — preserving untouched tags byte-for-byte. A verify panel shows the segment structure before and after, with changed tags highlighted.

03. Problem Statement

Batch EXIF editing is either one-image-at-a-time or opaque about what changes, and file formats stay abstract for students. This project builds an honest binary-level tool: real JPEG segment parsing with DataView, a safe segment rebuild that never touches image data, and a verify panel exposing the exact before/after bytes — demonstrating binary formats, parsing and data preservation through a genuinely useful tool.

04. Objectives

- Parse the JPEG APP1/EXIF segment at binary level: TIFF header, IFD0, EXIF sub-IFD, ASCII/short/rational tag decoding, in dependency-free code.
- Display every decoded tag (camera, exposure, ISO, date) in a readable table.
- Batch-apply title, artist, copyright and date-taken across any selected subset in one action.
- Rebuild the EXIF segment with new values while preserving untouched tags byte-for-byte.
- Show segment size, entry counts and a before/after tag table with changed rows highlighted before export.
- Export genuine JPEGs with rewritten EXIF, verifiable in any metadata viewer.
- Deliver the format documentation, samples and full viva kit (report, PPT, Q&A;).

05. Proposed Methodology

Each JPEG is scanned for the APP1 marker; the “Exif\0\0” header identifies the metadata segment. The TIFF header reveals the byte order, and IFD0 is walked entry by entry — tag, type, count, value/offset. ASCII tags (title, artist, copyright), the EXIF sub-IFD pointer and rational tags (exposure, f-number, focal length) are decoded into readable values. The user selects images and enters new values; a diff table previews old vs new per field. On export, a new EXIF segment is built — edited tags get fresh values, all other tags copied byte-for-byte; the old APP1 segment is removed and the rebuilt one inserted after the SOI marker, producing a valid JPEG.

06. System Architecture / Working

A library panel holds the image set (three genuine-EXIF samples plus user uploads) with canvas thumbnails; a tag table shows decoded EXIF per image; the batch editor applies new values with an old-vs-new diff preview; and the verify & export panel shows APP1 segment size, entry counts and the before/after tag table with changed rows highlighted. Files download with their original names and open correctly in any EXIF viewer. The whole app is one zero-dependency HTML file; edited pixels are never re-encoded — only the APP1 segment is rebuilt.

07. Hardware / Software Requirements

- Any modern web browser with JavaScript (DataView binary parsing)
- No server, no network, no libraries — single HTML file
- JPEG images with APP1/EXIF segments (files without EXIF report “no EXIF” honestly)
- Any EXIF viewer (e.g. ExifTool) for independent verification of exports
- Git

08. Expected Outcomes

- A working binary-level EXIF parser covering TIFF headers, IFDs and rational tags.
- One-action batch editing of descriptive fields with an old-vs-new diff preview.
- A safe segment rebuild that preserves camera/exposure tags byte-for-byte.
- Exported JPEGs verifiable in any third-party EXIF viewer.
- A full viva kit: report on JPEG/EXIF format theory, PPT and Q&A; on markers, TIFF/IFD structure, tag types and endianness.

09. Applications

- Batch metadata correction for photographers, college teams and archivists.
- Teaching binary file formats, parsing, endianness and data preservation.
- Verifying what metadata tools actually write into files.

10. Future Scope

- XMP/IPTC block support.
- PNG, HEIC and RAW format coverage.
- GPS geotag editing with map picker.
- Thumbnail (IFD1) regeneration on edit.