

Image Metadata Overlay

A Python tool that reads JPG images, extracts EXIF metadata (date, time, GPS location), and creates copies with configurable text overlays displaying this information.

Features

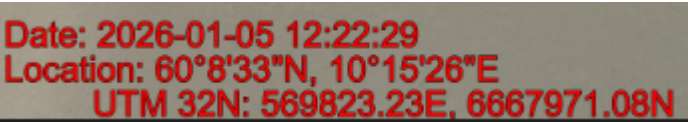
- 📷 Extracts EXIF metadata from JPG images
- 🕒 Displays date and time from image metadata
- 📍 Shows GPS location in human-readable format (e.g., 40°42'46"N, 74°0'21"W)
- 🗺️ Converts GPS coordinates to UTM or other projected coordinate systems
- 🧭 Displays image direction in degrees with cardinal directions (N, NE, E, SE, S, SW, W, NW)
- 📄 Optional project information overlay at the top of images
- 🎨 Customizable text appearance (color, size, position)
- ✨ Text outline for better visibility using native Pillow stroke API
- 🔄 Batch processing with multiprocessing (up to 6 workers by default)
- 🛡️ Preserves original EXIF metadata in output files
- 📁 Smart file collision handling (rename, skip, or overwrite)
- 📊 Progress bars for batch operations
- 📝 Comprehensive logging with file output support
- ⚙️ Command-line interface with extensive options
- ☑️ Dry-run mode for preview without processing

Example Output

The overlay will display metadata like:

```
Project XYZ - Survey 2024

image001
Date: 2024-08-15 14:30:22
Location: 40°42'46"N, 74°0'21"W
UTM 32N: 123456.78E, 987654.32N
Height: 125.3 m
Direction: 45° (NE)
```



If an image has no metadata, it will display: "No metadata available"



Project Structure

```
multiImageTextOverlay/
├── main.py           # Entry point - run this to process images
├── image_processor.py # Core image processing and overlay logic
├── exif_handler.py   # EXIF metadata extraction utilities
├── config.py         # User-configurable settings with validation
├── requirements.txt   # Python dependencies
├── input/            # Place your JPG images here (configurable)
├── output/           # Processed images will be saved here (configurable)
├── fonts/            # TrueType font files
│   └── arial.ttf     # Default font (you need to add this)
```

Installation

1. Clone or download this project

2. Install Python dependencies:

```
pip install -r requirements.txt
```

3. Add a TrueType font file:

- Download a font file (e.g., Arial, Roboto, etc.) in **.ttf** format
- Place it in the **fonts/** directory
- Update **FONT_PATH** in **config.py** to match your font filename

Usage

Basic Usage

1. Add JPG images to the **input/** folder

2. Run the script:

```
python main.py
```

3. Find processed images in the **output/** folder

Command-Line Options

```
# Process with default settings
python main.py

# Specify custom input/output directories
python main.py --input photos --output processed

# Customize text appearance
```

```
python main.py --position top-right --color 255 0 0 --font-size 72

# Control processing
python main.py --workers 4 --collision skip

# Add project information
python main.py --project-info "Highway Survey 2026 - Phase 1"

# Use 16-sector compass for more precise directions
python main.py --direction-precision 16

# Disable direction display
python main.py --no-direction

# Enable verbose logging
python main.py --verbose

# Save logs to file
python main.py --log-file process.log

# Preview without processing
python main.py --dry-run

# Combine options
python main.py -i photos -o processed -p top-right -c 255 255 0 -s 60 --project-info "Survey 2026" -v
```

Available Options

-h, --help	Show help message and exit
-i, --input DIR	Input directory containing images (default: input)
-o, --output DIR	Output directory for processed images (default: output)
-p, --position POS	Text position: top-left, top-right, bottom-left, bottom-right
-c, --color R G B	Text color as RGB values 0-255
-s, --font-size SIZE	Font size in points
-q, --quality QUALITY	Output JPEG quality 1-100
--target-epsg EPSG	Target EPSG code for coordinate transformation
--no-utm	Disable UTM coordinate display
--show-direction	Enable image direction display
--no-direction	Disable image direction display
--direction-precision {8,16}	Cardinal direction precision (8 or 16 sectors)
--project-info TEXT	Project information text displayed at top
-w, --workers N	Maximum number of parallel workers (max 6)
--collision MODE	File collision handling: overwrite, skip, rename
--dry-run	Preview files without processing
-v, --verbose	Enable debug logging
--quiet	Suppress console output except errors
--log-file FILE	Save logs to specified file

Configuration Options

Edit `config.py` to customize default settings:

Directory Settings

- `INPUT_DIR`: Default input directory (default: "input")
- `OUTPUT_DIR`: Default output directory (default: "output")

Text Appearance

- `TEXT_COLOR`: RGB tuple for text color (default: (255, 255, 255) - white)
- `OUTLINE_COLOR`: RGB tuple for outline color (default: (0, 0, 0) - black)
- `OUTLINE_WIDTH`: Outline thickness in pixels (default: 2)

Font Settings

- `FONT_SIZE`: Font size in points (default: 96)
- `FONT_PATH`: Path to TrueType font file (default: "fonts/arial.ttf")

Text Positioning

- `TEXT_POSITION`: Corner placement - `'top-left'`, `'top-right'`, `'bottom-left'`, `'bottom-right'`
- `PADDING`: Distance from image edge in pixels (default: 20)

Output Settings

- `OUTPUT_QUALITY`: JPEG quality 1-100 (default: 95)

Coordinate System Settings

- `SHOW_UTM_COORDINATES`: Enable/disable UTM coordinate display (default: True)
- `TARGET_EPSG`: Target EPSG code for coordinate transformation (default: 25832 - UTM Zone 32N)
- `UTM_ZONE`: UTM zone number for display (default: 32)
- `UTM_HEMISPHERE`: UTM hemisphere, 'N' or 'S' (default: 'N')

Direction Settings

- `SHOW_DIRECTION`: Enable/disable image direction display from GPS data (default: True)
- `DIRECTION_PRECISION`: Cardinal direction precision - 8 or 16 sectors (default: 8)
 - 8 sectors: N, NE, E, SE, S, SW, W, NW (45° increments)
 - 16 sectors: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW (22.5° increments)

Project Information

- `PROJECT_INFO`: Optional text displayed at the top of the overlay (default: None)
 - Example: "Highway Survey 2026 - Phase 1" or "Bridge Inspection Q1"

Processing Settings

- **MAX_WORKERS**: Maximum number of parallel workers (default: 6)
- **FILE_COLLISION_MODE**: How to handle existing files - 'overwrite', 'skip', 'rename' (default: 'rename')

Coordinate System Conversion

The tool supports automatic conversion of GPS coordinates (WGS84) to UTM or other projected coordinate systems:

- **WGS84 to UTM conversion**: GPS coordinates are automatically transformed to UTM coordinates
- **Customizable target CRS**: Configure any EPSG code in `config.py` (e.g., 25832 for UTM Zone 32N, 25833 for UTM Zone 33N)
- **Display both formats**: Shows both degree-minute-second format and UTM coordinates on the image
- **Efficient caching**: Coordinate transformers are cached per process to optimize batch operations
- **Error resilient**: Falls back gracefully if coordinate transformation fails

The coordinate conversion uses the **pyproj** library, which provides accurate transformations between different coordinate reference systems based on PROJ definitions.

Dependencies

- **Pillow (PIL)** >= 10.0.0: Image processing and text rendering
- **piexif** >= 1.1.3: EXIF metadata extraction
- **tqdm** >= 4.65.0: Progress bars for batch processing
- **pyproj** >= 3.0.0: Coordinate system transformations (WGS84 to UTM/other CRS)

Advanced Features

Image Direction

The tool extracts GPS image direction (bearing) from EXIF data when available:

- **Automatic extraction**: Reads `GPSImgDirection` from EXIF metadata
- **Degree display**: Shows precise bearing (0-360°)
- **Cardinal conversion**: Converts to human-readable directions (N, NE, E, etc.)
- **Configurable precision**: Choose 8-sector or 16-sector compass
- **Graceful fallback**: Shows "Direction: N/A" when GPS direction is unavailable

Project Information

Add custom project information that appears at the top of every processed image:

- **Flexible text**: Any descriptive text (project name, survey ID, date, etc.)
- **Consistent branding**: Apply the same header to all images in a batch
- **Command-line or config**: Set via `--project-info` flag or `PROJECT_INFO` in `config.py`

Multiprocessing

The tool automatically uses up to 6 CPU cores for parallel processing of images, significantly speeding up batch operations. You can adjust this with the `--workers` option.

EXIF Preservation

Original EXIF metadata is preserved in processed images, including camera settings, GPS data, and timestamps.

File Collision Handling

- **rename** (default): Adds a counter suffix to avoid overwriting (e.g., image_1.jpg, image_2.jpg)
- **skip**: Skips processing if output file already exists
- **overwrite**: Replaces existing files

Logging

- Console logging with INFO level by default
- `--verbose` enables DEBUG level logging with timestamps
- `--quiet` suppresses all output except errors
- `--log-file` saves complete logs to a file for review

Error Handling

Robust error handling with specific exception catching for:

- Invalid image files
- Corrupted EXIF data
- Missing fonts
- File I/O errors
- Invalid GPS coordinates

Notes

- Only JPG/JPEG images are currently supported
- Images without EXIF data will still be processed but show "No metadata available"
- GPS coordinates are displayed in degrees, minutes, seconds format
- Image direction is only shown if GPS direction data (`GPSTimeDirection`) is available in EXIF
 - Most modern smartphones and drones with GPS+compass record this data
 - Images without direction data will show "Direction: N/A" if direction display is enabled
- Configuration is validated at startup to catch errors early
- Font fallback mechanism tries multiple system fonts if custom font fails
- Original images in the `input/` folder are not modified

License

This project is open source and available for personal and commercial use.