Gold Nanoparticle Counter – User Manual

### Overview

The Gold Nanoparticle Counter is a tool for detecting and counting gold nanoparticles labels in TEM images of tuberculosis cells. It provides an intuitive interface for uploading images, processing them with advanced detection algorithms, and managing results with tagging, adjustment, and export features.

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### Getting Started

* Download all needed dependencies
* Start the backend server from the main folder (*fastapi dev Frontend/main.py*).
* Open your web browser and navigate to the provided local address (<http://127.0.0.1:8000/client>).

### Uploading and Processing Images

#### Upload Folder

Click the "Upload Folder" button and select a folder containing your microscopy images.

Supported image input format: .tif

Supported image output formats: .jpg, .png, .jpeg

#### Process Images

Click "Process Images" to start analysis.

A loading bar will indicate that the backend has received and is processing the image(s).

The application will skip images already processed before if "Only Run New Images" is enabled in settings.

### Viewing and Managing Results

#### Main Table

Displays results/info for the currently selected images:

* Image Name
* Normal Dots: Single detected nanoparticles.
* Cluster Dots: Estimated count in clusters.
* Total Dots: Sum of normal and cluster dots.
* Adjust Dots: Manual adjustment field.
* Tags: Assigned tags.
* Area nm²: Detected cell area.
* Dots/nm²: Density calculation.
* View Image: Opens the processed image.

**Select All**: Select or unselect all rows for bulk actions.

**Clear Table**: Removes all rows from the main table (does not delete files).

#### Previous Runs

* Shows all previously processed images.
* Filter by tag using the dropdown.
* Add to Main Table: Move selected results to the main table for further analysis.
* Delete Selected: Permanently deletes selected results (image and JSON).

### Tagging System

Create Tag:

* Enter a tag name and click "Create Tag".
* Tags are managed globally and can be assigned to any image.

Assign Tags:

* Select images in the main table.
* Select one or more tags from the "Select Tag(s)" dropdown.
* Click "Add Tags" to assign.

Clear Tags:

* Select images and click "Clear Tags" to remove all tags from those images.

Filter by tag:

* In the Previous Runs panel the user can filter the images by tag.

### Adjusting Dot Counts

* In the main table, use the "Adjust Dots" field to manually correct the total dot count for any image.
* The adjusted value is automatically saved, and changing this value causes the "Total Dots" and "Dots/nm²" columns to update its value.

### Exporting Data

Export to CSV:

* Click the "Export to CSV" button in the main table to download all current results as a CSV file.
* The CSV includes: Image, Normal Dots, Cluster Dots, Total Dots, Adjust Dots, Tags.

### Settings

Access the Settings tab to customize detection and output parameters.

General Settings:

* Predict best settings, minimum dot area, dot blur, etc.

Advanced Settings:

* Circularity thresholds, cluster detection, dynamic thresholds, etc.
* Toggle "Show Advanced Settings" to reveal more options.

Output Settings:

* Output directory, image format, color settings.

Cell Detection & Dot Detection:

* Adjust parameters for cell and dot identification.

Reset:

* All inputs besides checkboxes have a "Reset" button to revert individual fields to default values.

Submit:

* Click "Submit" to save changes.

### Credits

* Project by Bram Koobs and Michiel Meeuwisse
* Hanze University of Applied Sciences & University of Amsterdam
* See the Credits tab in the app for full acknowledgments and contact details.

### Troubleshooting

Images not processing:

* Ensure images have not been processed before and

Settings not saving:

* Click checkboxes to expand advanced settings before submitting.

Tag or adjustment not updating:

* Refresh the page or restart the backend/server

### File Structure

#### Frontend/

* **client.html:** Main web interface.
* **Settings\_content.html**: Settings page web interface
* **main.py**: FastAPI backend serving the UI and API.
* **config.yml, config\_default.yml**: Settings files.
* **output**: Processed images and JSON results.

#### Backend/

* **blackdotdetector.py**: Core detection logic.
* **scale\_finder.py**: Automatic scale detection.
* **model.pkl**: ML model for parameter prediction.

### Notes

* All results (images, JSON, tags) are stored in the configured output directory.
* Tags are managed (and currently only able to be deleted) in Output/Tags/tags.json.
* Each processed image has a corresponding .json file with all result data and tags.