BACKLOG

Epic 1: Project Setup and Research

- **User Story 1.1: Research Image Processing Techniques**
  - **Tasks**:
    - Study Gaussian and Median filters for noise reduction.
    - Research inpainting and interpolation for scratch removal.
    - Understand histogram equalization and brightness/contrast adjustments.
    - Review methods for unsharp masking.
  - **Acceptance Criteria**:
    - Documented understanding of each technique.
    - List of references and examples for each technique.
- **User Story 1.2: Set Up Development Environment**
  - **Tasks**:
    - Set up Python environment with required libraries (NumPy, Matplotlib, PIL).
    - Test loading and displaying images.
  - **Acceptance Criteria**:
    - Development environment is fully configured and tested.
    - Code for loading and displaying images is working.

Epic 2: Data Collection and Preprocessing

- **User Story 2.1: Collect Dataset of Old and Damaged Photos**
  - **Tasks**:
    - Download a dataset of old photos or collect your own.
    - Organize images into folders for training, testing, and validation.
  - **Acceptance Criteria**:
    - A minimum dataset size established (e.g., 50 images).
    - Dataset organized and ready for processing.
- **User Story 2.2: Preprocess Images for Restoration**
  - **Tasks**:
    - Resize images to a workable resolution.
    - Convert images into arrays for manipulation.
  - **Acceptance Criteria**:
    - Images are resized and converted into arrays.
    - Preprocessing functions are documented and tested.

Epic 3: Implement Noise Reduction

- **User Story 3.1: Apply Gaussian Filter for Noise Reduction**
  - **Tasks**:
    - Implement a function to generate a Gaussian kernel manually.
    - Apply the kernel to images using convolution to reduce noise.
  - **Acceptance Criteria**:
    - Gaussian filter function tested and applies smoothing without excessive blur.
    - Sample outputs demonstrate effective noise reduction.
- **User Story 3.2: Apply Median Filter for Salt-and-Pepper Noise**
  - **Tasks**:
    - Implement a function to apply a median filter to each pixel's neighborhood.
    - Test with various kernel sizes and refine.
  - **Acceptance Criteria**:
    - Median filter reduces salt-and-pepper noise without distorting image edges.
    - Test results documented and include before-and-after comparisons.

DEADLINE: 24.11.2024 Pazar

Epic 4: Implement Scratch and Blemish Removal

- **User Story 4.1: Create Manual Mask for Damaged Areas**
  - **Tasks**:
    - Implement thresholding or create a tool for manual annotation of scratches.
    - Develop a function to generate binary masks.
  - **Acceptance Criteria**:
    - Binary mask correctly identifies scratched areas.
    - Code and mask samples are tested and documented.
- **User Story 4.2: Remove Scratches Using Interpolation**
  - **Tasks**:
    - Implement basic inpainting using interpolation techniques.
    - Fill scratched areas with neighboring pixel values.
  - **Acceptance Criteria**:
    - Scratches are visibly reduced without creating new artifacts.
    - Before-and-after images demonstrate effective scratch removal.

DEADLINE: 27.11.2024 Çarşamba (opt 29.11.2024)

Epic 5: Implement Contrast and Brightness Adjustment

- **User Story 5.1: Implement Histogram Equalization**
  - **Tasks**:
    - Calculate pixel intensity histogram.
    - Implement CDF-based equalization and map pixels accordingly.
  - **Acceptance Criteria**:
    - Histogram equalization function enhances contrast effectively.
    - Before-and-after results show improved visibility of faded images.
- **User Story 5.2: Apply Manual Brightness and Contrast Scaling**
  - **Tasks**:
    - Implement a brightness and contrast adjustment formula.
    - Test different values to achieve a balanced appearance.
  - **Acceptance Criteria**:
    - Function adjusts brightness and contrast with a natural effect.
    - Results are documented with a range of test images.

Epic 6: Implement Sharpness Enhancement

- **User Story 6.1: Implement Unsharp Masking for Sharpening**
  - **Tasks**:
    - Generate a blurred version of the image using the Gaussian filter.
    - Subtract blurred image from the original and add it back with scaling.
  - **Acceptance Criteria**:
    - Unsharp masking produces clear, sharpened images without excessive artifacts.
    - Tests confirm improved edge definition.

Epic 7: Combine Restoration Techniques into Pipeline

- **User Story 7.1: Develop Restoration Pipeline Function**
  - **Tasks**:
    - Sequentially apply noise reduction, scratch removal, contrast adjustment, and sharpening.
    - Test pipeline on different images and adjust the order if needed.
  - **Acceptance Criteria**:
    - Pipeline function applies all techniques and produces restored images.
    - Documented tests show improvements in image quality for various types of damage.

Epic 8: Evaluation and Testing

- **User Story 8.1: Implement Evaluation Metrics**
  - **Tasks**:
    - Write functions to calculate PSNR and SSIM.
    - Evaluate restored images using these metrics.
  - **Acceptance Criteria**:
    - PSNR and SSIM scores are generated and included in tests.
    - Results provide quantitative proof of quality improvement.
- **User Story 8.2: Qualitative Evaluation and Feedback**
  - **Tasks**:
    - Perform visual comparisons and gather feedback on restoration quality.
    - Document subjective feedback on each technique.
  - **Acceptance Criteria**:
    - Before-and-after images compared with qualitative feedback.
    - Documentation of feedback and areas for improvement.

Epic 9: Final Presentation and Reporting

- **User Story 9.1: Prepare Presentation of Project Results**
  - **Tasks**:
    - Create slides with before-and-after images, descriptions, and metrics.
    - Summarize project goals, techniques, and outcomes.
  - **Acceptance Criteria**:
    - Presentation ready with clear visuals and explanations.
    - Feedback from peers confirms clarity and thoroughness.
- **User Story 9.2: Document Project for Final Report**
  - **Tasks**:
    - Write a report detailing methods, results, and technical challenges.
    - Include sample outputs and analysis.
  - **Acceptance Criteria**:
    - Report is clear, thorough, and provides a full account of project work.
    - Report includes visuals and is reviewed for completeness.