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that automatically corrects these issues for both images and PDFs.

Assignment

Create a Python class `RotationHandler` that can:

1. Detect and fix image/PDF orientation issues
2. Remove skew (deskew images)
3. Crop unnecessary whitespace
4. Resize images to reasonable dimensions
5. Enhance image quality for better readability
6. Process both single images and multi-page PDFs efficiently

Requirements

- Your solution should handle both PDF files and common image formats (JPG, PNG)
- It should correct rotation based on text orientation detection
- It should handle EXIF rotation data in photos
- It should optimize memory usage when processing large PDFs
- Include proper error handling and logging
- Support verification of orientation correction

Starter Code

```
# Standard library imports - complete as needed
```

```
import io
```

Required third-party libraries

You'll need: cv2, img2pdf, numpy, pytesseract, deskew, pdf2image, PIL

```
class RotationHandler:

    """Handles rotation correction for images and PDFs.

    Your class documentation here...

    """

    # Add appropriate constants here

    def __init__(self, verify_rotation: bool = False):

        """Initialize with configuration options."""

        # Your code here

        pass

    # Implement the following methods:

    # - _fix_exif_rotation

    # - _crop_whitespace

    # - _resize_image

    # - _enhance_image

    # - _rotate_image

    # - _deskew_image

    # - _detect_orientation

    # - _is_blank_image

    # - _process_image

    # - handle_image_rotation

    # - _pdf_to_images_generator

    # - handle_pdf_rotation
```

Hints

1. Use Tesseract OCR for text orientation detection (`pytesseract.image_to_osd`)
2. The deskew library can help determine skew angles

6. Handle EXIF orientation data to fix photos taken with smartphones or digital cameras
7. Use OpenCV for advanced image processing operations

Instructions for Testing

1. Set up a Python environment with the required dependencies
2. Create a test folder with sample PDFs and images with orientation issues
3. Test your implementation on these files and verify the results

Deliverables

- Complete Python module with the RotationHandler class implementation
- Brief documentation explaining your approach
- Sample execution code showing how to use your implementation

Evaluation Criteria

- Correctness: Does the code properly detect and fix orientation issues?
- Robustness: Does it handle different types of files and edge cases?
- Code quality: Is the code well-structured, documented, and maintainable?
- Memory efficiency: Does it handle large PDFs without excessive memory usage?
- Error handling: Does it gracefully handle potential errors?

Resources

- PyTesseract documentation: <https://github.com/madmaze/pytesseract>

Deskew documentation: <https://github.com/chrunner/deskew>