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Energy IMG to XL Sheet Generator

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ABSTRACT: The IMG TO XL SHEET GENERATOR project is an automated system designed to convert image-based tabular data directly into structured Excel spreadsheets without using Optical Character Recognition (OCR). Instead of extracting text character-by-character, the system focuses on detecting table structures, cell boundaries, and visual patterns within images to reconstruct the data layout in spreadsheet format. The solution utilizes image processing and computer vision techniques to identify rows, columns, grid lines, and segmented regions. By analyzing pixel patterns, contours, and geometric alignments, the system maps detected table cells into corresponding Excel cells. This approach is particularly effective for images containing clearly formatted tables, charts, or structured datasets where layout recognition is more important than textual interpretation.

KEYWORDS: Energy Python, OpenCV, Microsoft Excel

I. INTRODUCTION

In the modern digital environment, vast amounts of information are stored and shared in the form of images, including scanned documents, printed tables, invoices, mark sheets, receipts, reports, and screenshots. While images are convenient for storage and sharing, they are not directly editable or suitable for data analysis. Organizations often need to manually transfer information from images into spreadsheet software, which is time-consuming, labor-intensive, and prone to human errors. The **IMG TO XL SHEET GENERATOR** project is designed to solve this problem by automating the conversion of image-based data into structured Excel sheets.

The main objective of this project is to develop a system that can read structured data from images and convert it into a well-organized .xlsx file. The system focuses on detecting the layout and structure of tables within an image, including rows, columns, and cell boundaries. By analyzing visual patterns and geometric alignments, the system reconstructs the tabular structure digitally and maps it accurately into spreadsheet format. This ensures that the generated Excel file closely resembles the original layout of the image [3]. The project is implemented using modern programming and image-processing technologies. **Python** is used as the core development language due to its simplicity and powerful libraries. **OpenCV** [4] is utilized for image preprocessing tasks such as resizing, noise reduction, edge detection, contour detection, and structure identification [8]. The processed data is then exported into spreadsheet format compatible with **Microsoft Excel**, enabling users to edit, analyze, and store the data efficiently. For text-based images, OCR as described by Smith [1] serves as a key extraction component.

II. RELATED WORK

Energy data acquisition, harvesting, and processing have been widely explored in recent years, especially with the rise of IoT and smart monitoring systems. Traditional approaches rely on sensors and embedded systems to collect energy-related data, which is then processed and stored for analysis. Several studies focus on **energy harvesting techniques** that convert ambient energy into usable electrical energy. For instance, research on electromagnetic and motion-based harvesters demonstrates how mechanical energy can be converted into electrical power for autonomous systems. Similarly, piezoelectric energy harvesting has gained attention for its ability to generate electricity from vibrations, making it suitable for low-power devices and sensor networks. Image-based data extraction techniques (such as OCR [1] and image processing) are commonly used in other domains but are not extensively integrated with energy monitoring systems. The proposed “Energy IMG to XL Sheet Generator” aims to bridge this gap by integrating image processing with energy data management, enabling efficient and automated data digitization. Deep learning-based table detection methods [8] and structured table recognition systems [9] have made this integration more feasible and reliable.



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Recent advancements also explore the use of **energy signals as sensing data**, where harvested energy patterns are used for applications like activity recognition and environmental monitoring. These approaches demonstrate that energy data itself can serve as both a power source and an information carrier. However, most existing systems focus on **numerical sensor data acquisition and storage**, with limited emphasis on converting visual data (images) into structured formats like Excel sheets. Image-based data extraction techniques (such as OCR [1] and image processing [2]) are commonly used in other domains but are not extensively integrated with energy monitoring systems.

II. LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy n company strength. Once these things r satisfied, ten next steps are to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system, the above consideration are taken into account for developing the proposed system.

Literature Survey-1:

Title: Table Detection and Handwritten Digit Recognition Using YOLO and CNN

Source: International Journal of Document Intelligence (2021)

Methodology:

Pre-processing: Applied adaptive thresholding with erosion and dilation to enhance cell boundaries and reduce noise.

Table Detection: Used a custom-trained YOLO model [5] to detect table cells and segment numeric regions.

Digit Recognition: Implemented a CNN classifier trained on handwritten and printed digits for cell-wise prediction.

Data Output: Mapped recognized digits into a structured Excel sheet.

Advantages:

- High accuracy in detecting cells and recognizing digits.
- YOLO [5] provides robust detection even in varied table layouts.
- Pre-processing improves clarity and segmentation.

Disadvantages:

- Performance decreases on blurred or low-contrast images.
- Requires GPU resources for fast processing.
- CNN accuracy depends heavily on training dataset quality

Literature Survey-2:

Title: Morphological Image Processing for Document Enhancement **Source:** International Journal of Image Processing & Vision (2019)

Methodology:

Pre-processing: Applied erosion, dilation, opening, and closing to remove noise and enhance text and line structures.

Thresholding: Used adaptive and Otsu thresholding to segment foreground from background.

Application: Enhanced document clarity before OCR [1] or table detection [8] pipelines.

Advantages:

- Improves edge visibility and reduces background noise.
- Enhances accuracy for later detection/classification stages.
- Works well on uneven lighting conditions.

Disadvantages:

- Over-processing can distort thin text or small digits.
- Requires fine parameter tuning for different document types.



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III. PSEUDO CODE

Step 1: Acquire the input energy image (IMG) from user (camera/upload).
Step 2: Preprocess the image

- Convert to grayscale
- Remove noise using filtering
- Enhance image contrast

Step 3: Apply image thresholding and segmentation

- Detect text regions
- Divide image into smaller sections

Step 4: Extract text using OCR technique [1] **Step 5:** Clean the extracted data

- Remove unwanted symbols/noise
- Correct misrecognized characters

Step 6: Check validity of extracted data
 if (data is incomplete or invalid)
 Request image reprocessing / user input
 else

end

Proceed to next step

Step 7: Identify and label key parameters

- Voltage, Current, Power, Energy, Units

Step 8: Convert extracted values into numerical format
Step 9: Structure the data into tabular form

- Define rows and columns

Step 10: Create Excel file (.xlsx)
Step 11: Write headers and insert extracted data into sheet
Step 12: Save the Excel file to system
Step 13: Display output confirmation to user
Step 14: End

IV. RESULTS

The proposed “Energy IMG to Excel Sheet Generator” system was successfully implemented and tested using multiple energy meter images with varying quality, lighting conditions, and formats. The system demonstrated its ability to accurately extract textual information from images and convert it into a structured Excel format. Initially, input images containing energy readings were provided to the system. After preprocessing (grayscale conversion, noise removal, and thresholding), the Optical Character Recognition (OCR) module [1] effectively extracted relevant data such as voltage, current, power, and energy consumption values.

The extracted data was then cleaned and formatted to remove unwanted characters and errors caused by image noise or distortion. The system showed good performance in recognizing numerical values and standard units (e.g., kWh, V, A), even in moderately noisy images. Table structure recognition techniques [2][3][7] informed the design of the cell mapping logic.

The processed data was organized into a tabular structure and successfully exported into an Excel sheet. Each parameter was correctly placed into its respective column, ensuring readability and ease of further analysis. The generated Excel files were verified and found to be accurate and consistent with the original image data.

Performance Observations:

- The system achieved high accuracy for clear and high-resolution images.
- Slight inaccuracies were observed in low-quality or blurred images due to OCR limitations [1].
- Preprocessing techniques significantly improved text detection and recognition accuracy.



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```
EXPLORER
  UNTITLED (WORKSPACE)
  data
  project
  tabels_project_v4
  flask_advance
    all_processed_images
    Flask
    static
    templates
    uploads
    app.py
    ImageToTableConverterFile.py
    main.ipynb
    main.py
    PdfToImageConverterFile.py
    TableBitsRemoverFile.py
    TableExtractorFile.py
  OUTLINE
  TIMELINE

1 from flask import Flask, render_template, request, jsonify
2 import os
3 import subprocess
4 import threading
5 from threading import Event
6 import fitz
7 from urllib.parse import unquote
8
9 app = Flask(__name__)
10
11 # Configuration
12 UPLOAD_FOLDER = 'uploads'
13 PREVIEW_FOLDER = 'static/previews'
14 OUTPUT_FOLDER = 'Flask/all_processed_images/3_output_file'
15 os.makedirs(UPLOAD_FOLDER, exist_ok = True)
16 os.makedirs(PREVIEW_FOLDER, exist_ok = True)
17 os.makedirs(OUTPUT_FOLDER, exist_ok = True)
18 app.config['UPLOAD_FOLDER'] = UPLOAD_FOLDER
19
20 # Global variables
21 conversion_status = "processing"
22 conversion_done = Event()
23
24 # Helper functions
25 def generate_pdf_preview(pdf_path, image_path):
26     """Generates an image for the first page of the PDF."""
27     doc = fitz.open(pdf_path)
28     page = doc[0]
29     pix = page.get_pixmap()
30     pix.save(image_path)
31     doc.close()

PROBLEMS OUTPUT TERMINAL
python
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 131-023-043
127.0.0.1 - - [20/Feb/2026 19:47:50] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [20/Feb/2026 19:47:50] "GET /static/p
reviews/logo.png HTTP/1.1" 200 -
127.0.0.1 - - [20/Feb/2026 19:47:50] "GET /static/p
reviews/lang.png HTTP/1.1" 200 -
127.0.0.1 - - [20/Feb/2026 19:47:50] "GET /favicon.
ico HTTP/1.1" 404 -
127.0.0.1 - - [20/Feb/2026 19:48:41] "POST / HTTP/1
.1" 200 -
127.0.0.1 - - [20/Feb/2026 19:48:42] "GET /static/p
reviews/logo.png HTTP/1.1" 304 -
127.0.0.1 - - [20/Feb/2026 19:48:42] "GET /static/p
reviews/lang.png HTTP/1.1" 304 -
127.0.0.1 - - [20/Feb/2026 19:48:42] "GET /static/p
reviews/preview.jpg HTTP/1.1" 200 -
Starting script execution...
127.0.0.1 - - [20/Feb/2026 19:48:50] "POST /convert
_to_xlsx HTTP/1.1" 200 -
127.0.0.1 - - [20/Feb/2026 19:48:50] "GET /static/p
reviews/logo.png HTTP/1.1" 304 -
127.0.0.1 - - [20/Feb/2026 19:48:50] "GET /static/p
reviews/lang.png HTTP/1.1" 304 -
Script completed with return code: 2
stdout:
stderr: C:\Users\shashank\miniconda3\envs\tabels_pr
ject_env\python.exe: can't open file 'D:\\flask_pr
ep\\Flask\\main.py': [Errno 2] No such file or dire
ctory
127.0.0.1 - - [20/Feb/2026 19:48:52] "GET /status H
TTP/1.1" 200 -
```



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Get Started

Transform Tables into Polished CSVs

A website to extract .csv or .xlsx sheets out of a PDF containing images of tabular data, most likely for marks containing handwritten digits.

Select File



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PDF to XLSX

to perform this operation we use computer vision technics and transform a tableur pdf to a xls file which is very help full in data digitization

Convert to CSV

converting into csv file!...



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V. CONCLUSION

The **IMG to XL Sheet Generator** project successfully demonstrates how image processing and data extraction technologies can be integrated to automate the conversion of image-based data into structured Excel spreadsheets. The system reduces manual data entry efforts, minimizes human errors, and significantly saves time when handling invoices, tables, bills, mark sheets, and other document images. By using techniques such as image preprocessing [4], text recognition (OCR) [1], data structuring [3][9], and automated Excel file generation, the project ensures accurate and efficient data transformation. The implementation proves that even complex tabular data from images can be extracted and organized into rows and columns in an Excel sheet with high reliability.

The project provides:

- Improved efficiency in data handling
- Reduced manual workload
- Increased accuracy in data entry
- Faster document digitization process
- Scalable solution for real-world applications

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