Documentation for "Neural Tensor" Jupyter Notebook

Overview
This Jupyter Notebook appears to be focused on image processing and analysis, possibly involving Optical Character Recognition (OCR) with additional image manipulation features. The exact purpose and scope of the project will become clearer as we delve deeper into the code.

Dependencies
The notebook relies on several external libraries, which are essential for its functionality:

- **numpy**: A fundamental package for scientific computing in Python.
- **pandas**: A library providing high-performance, easy-to-use data structures, and data analysis tools.
- **matplotlib.pyplot**: A plotting library for creating static, animated, and interactive visualizations.
- **cv2** (OpenCV): An open-source computer vision and machine learning software library.
- **math**: Provides access to mathematical functions.
- **warnings**: Used for controlling the display of warnings.
- **os**: Provides a way of using operating system-dependent functionality.
- **pytesseract**: An Optical Character Recognition (OCR) tool for Python.

Configuration and Setup
- **Tesseract Path**: A commented line suggests the need to specify the path for Tesseract OCR engine. This path may need to be configured based on the user's system setup.

Function Definitions

1.biggest_contour

- **Purpose:** This function seems to be used for identifying the largest contour in a given set of contours, which is a common task in image processing.
- **Inputs:**
  - contours: A list/array of contours to analyze.
- **Outputs:**
  - Returns the largest contour based on the area and specific geometric criteria (4-sided shape).
- **Process:**
  - Iterates over each contour, calculates its area, and checks if it's a quadrilateral (approximated with 4 points). The largest such contour by area is returned.

2. get_perspective
   - **Purpose:** This function processes an image to isolate and transform a specific region (likely the largest contour found in the image).
   - **Inputs:**
     - image_path: The path to the input image.
   - **Outputs:**
     - Various visualizations of the processing steps (gray scale conversion, binary thresholding, bilateral filtering, contour detection).
     - Cropped and transformed image region.
   - **Process:**
     - Reads the image and converts it to gray scale.
     - Applies thresholding and filtering to isolate features.
     - Identifies contours and utilizes the biggest_contour function to find the largest one.
     - Uses the largest contour to crop and possibly warp the image for further analysis.
     - Visualizes each step for verification.

3. ocr
    - **Purpose**: This function extracts text from specific regions of an image, likely for OCR purposes.
    - **Inputs:**
        - images_paths: Paths to the images from which text is to be extracted.
        - regions: A dictionary defining regions of interest on the image.
    - **Outputs:**
        - A DataFrame containing extracted text from each specified region.
    - **Process:**
        - Reads the image and processes it for text extraction.
        - Iterates over each specified region, applying specific image processing techniques tailored for each region (e.g., thresholding).
        - Uses pytesseract to perform OCR on each processed region.
        - Collects and returns the extracted text in a structured format (DataFrame).

Conclusion

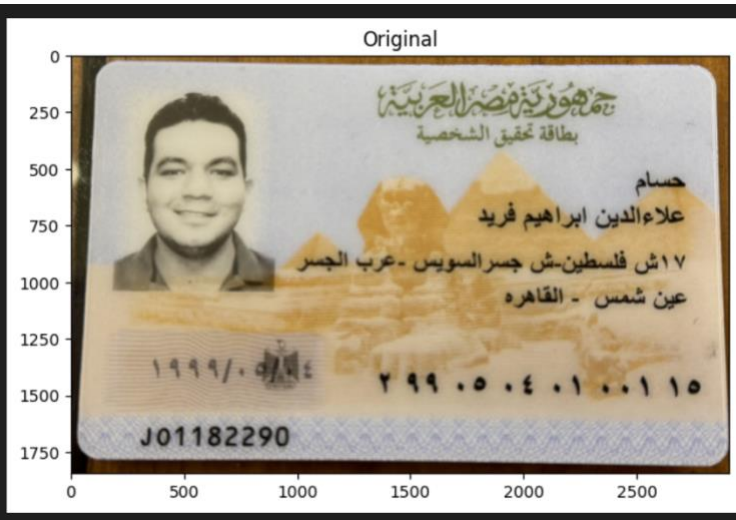
- This project is structured to process images for feature isolation and extract text from specific regions using OCR.
- It emphasizes visual feedback at each step, which aids in verifying the image processing techniques.
- Key functions include image processing (**get_perspective**), text extraction (**ocr**), and the orchestration of these processes in **main**.

Code Output

```
if __name__ == '__main__':
    main()
```

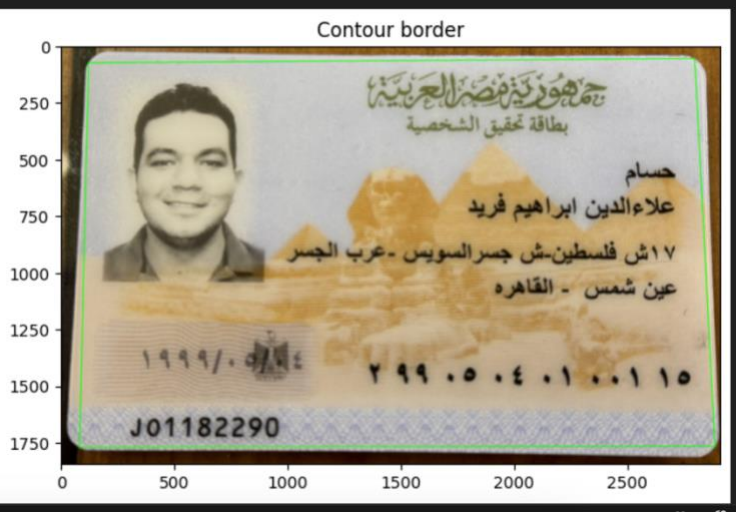
[921] ✓ 8.3s

```
...                                                          0
id                                                299 05 040100115
fname                                                      حسام
lname                                          علاء الدين ابراهيم فريد
address  اش فلسطين.ش جسرالسويس عرب الجسر عين سمس الفاهره٧
bdate                                                      ١٩٩٩
number                                                J011782290
id2                                              29905040100115
pdate                                                         ٩
job                                                  طالب |
gender                                                    اذكر
stutus                                                    اعزب
exdate                                                ٠4/٠٩/١٨
```

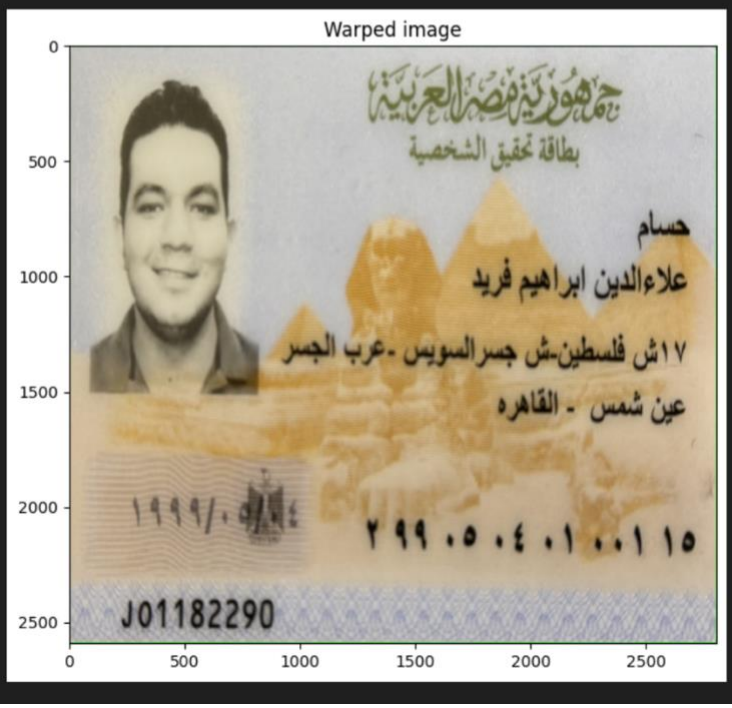

Original
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
١٩٩٩/٠٥/١٤
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290


gray scale image
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
١٩٩٩/٠٥/١٤
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290

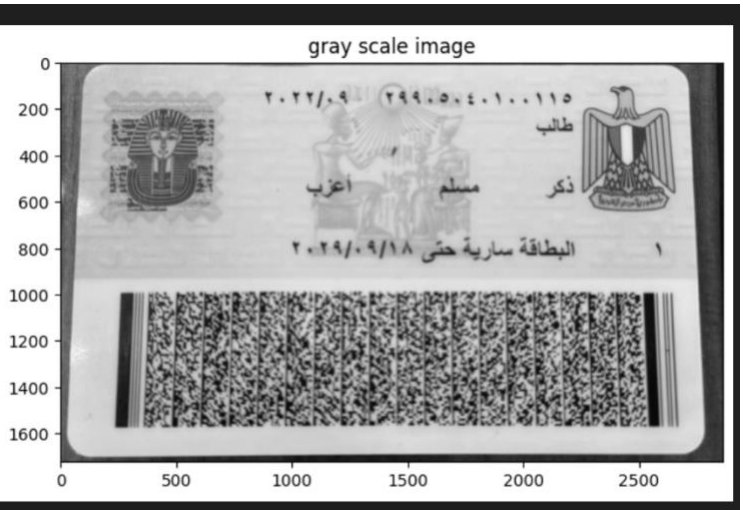

binary thresh
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
١٩٩٩/٠٥/١٤
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290

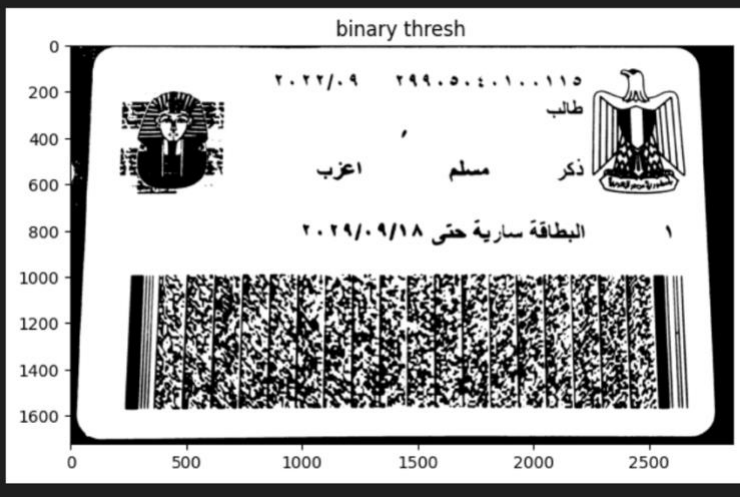

Contour border
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
١٩٩٩/٠٥/١٤
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290

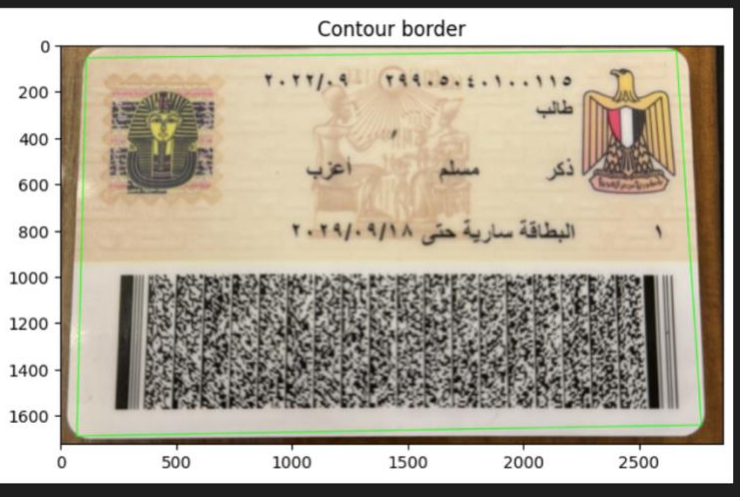

mask
cropped image
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290


Warped image
جمهورية مصر العربية
بطاقة تحقيق الشخصية
حسام
علاءالدين ابراهيم فريد
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره
٢٩٩٠٥٠٤٠١٠٠١١٥
J01182290

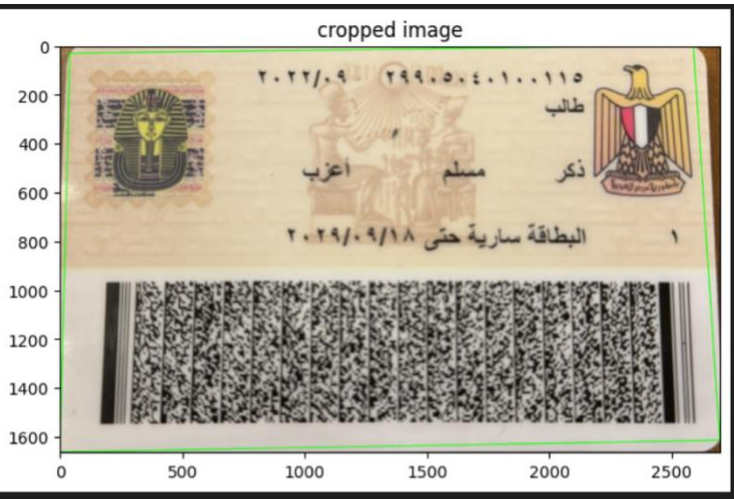

Original
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم اعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

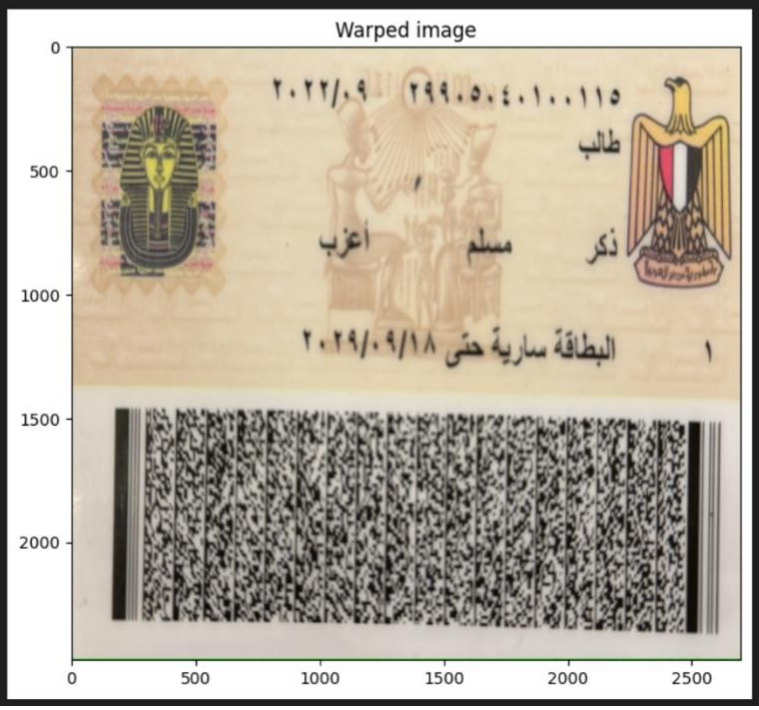

gray scale image
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم اعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

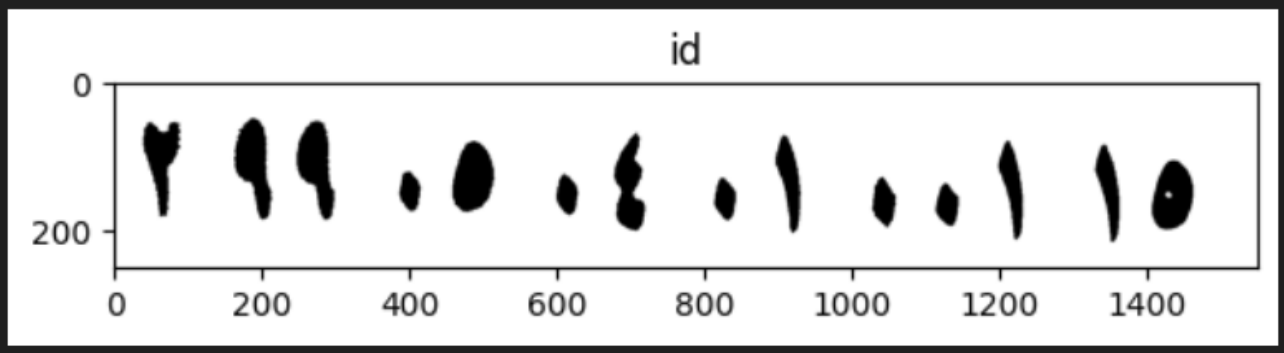

binary thresh
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم اعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

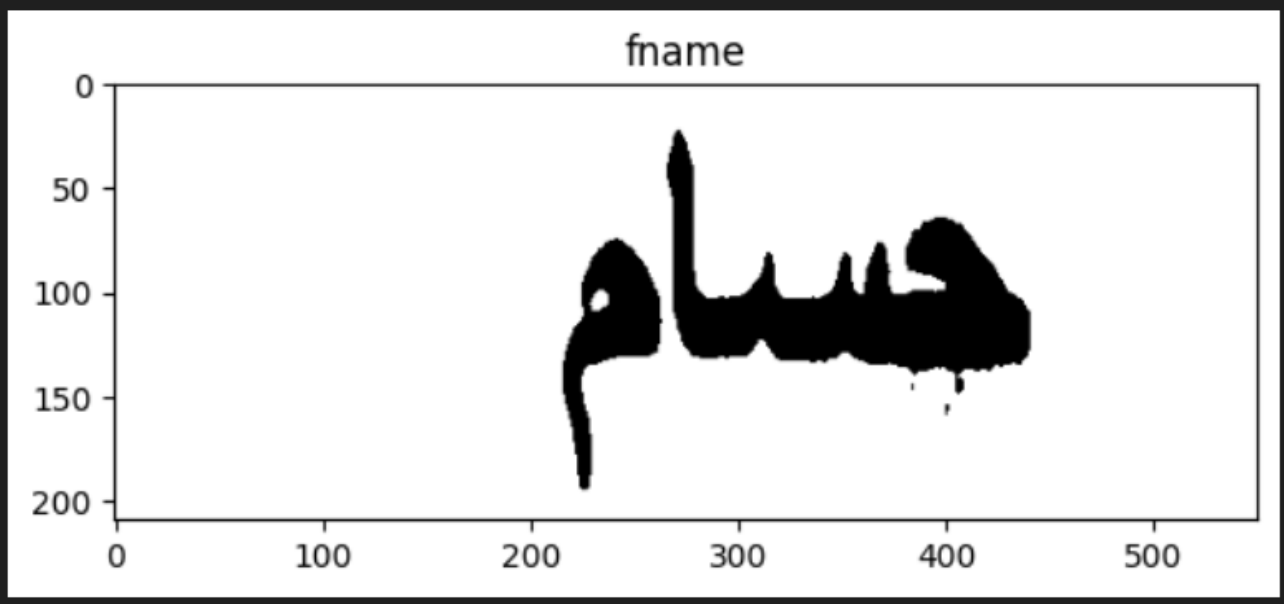

Contour border
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم اعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

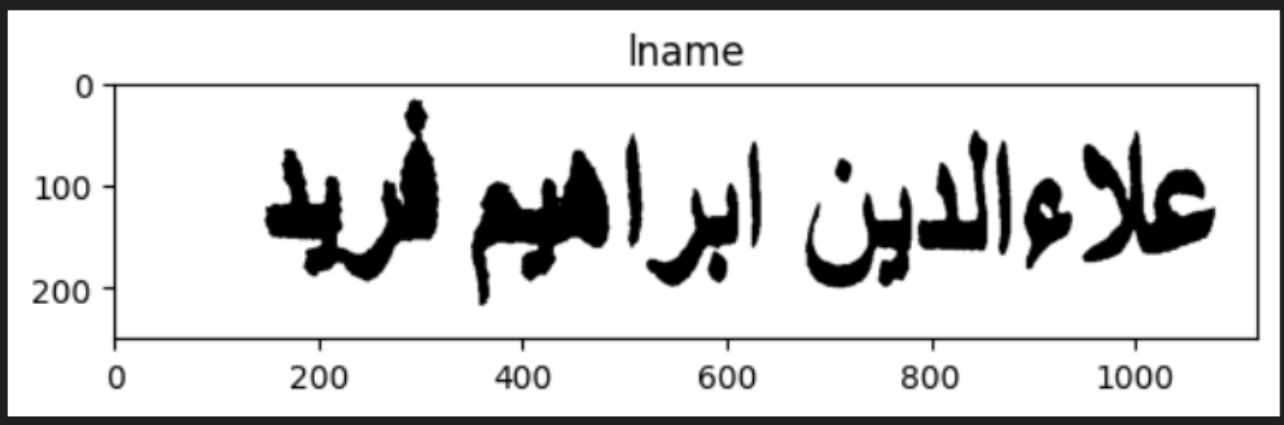

mask
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم أعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

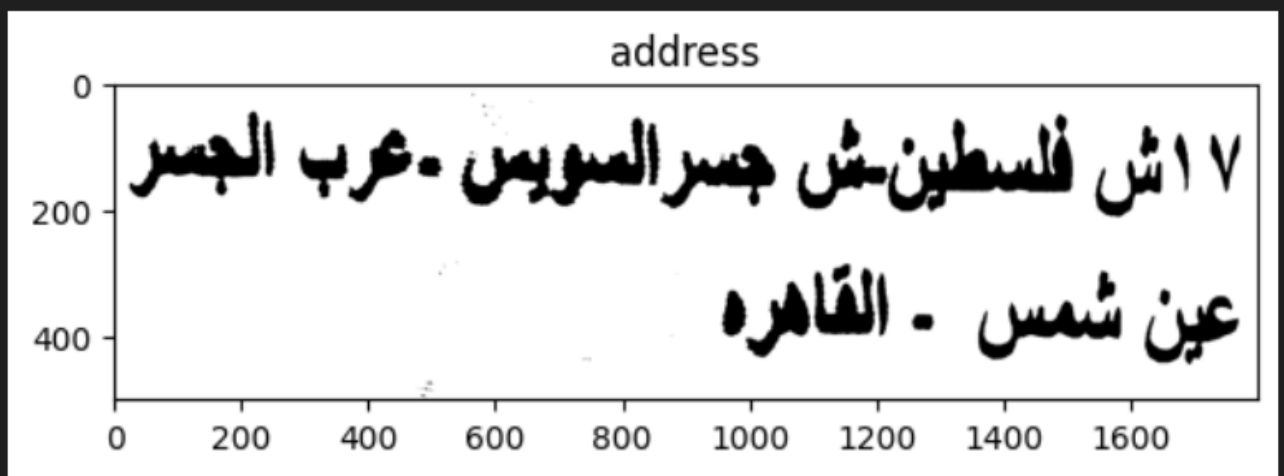

cropped image
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم أعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

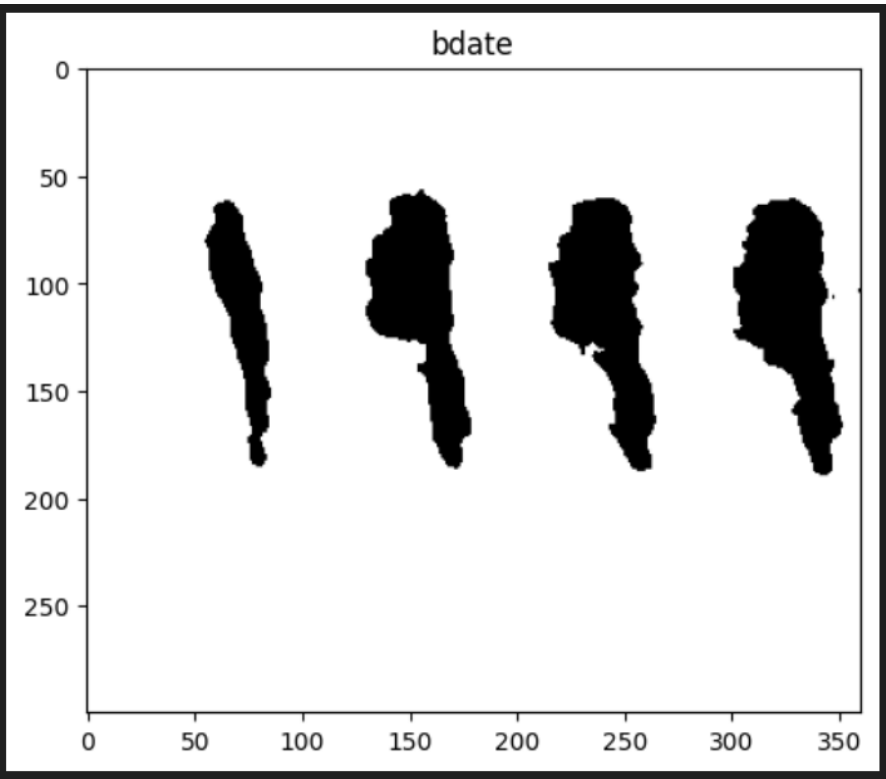

Warped image
٢٩٩٠٥٠٤٠١٠٠١١٥ ٢٠٢٢/٠٩
طالب
ذكر مسلم أعزب
١ البطاقة سارية حتى ٢٠٢٩/٠٩/١٨

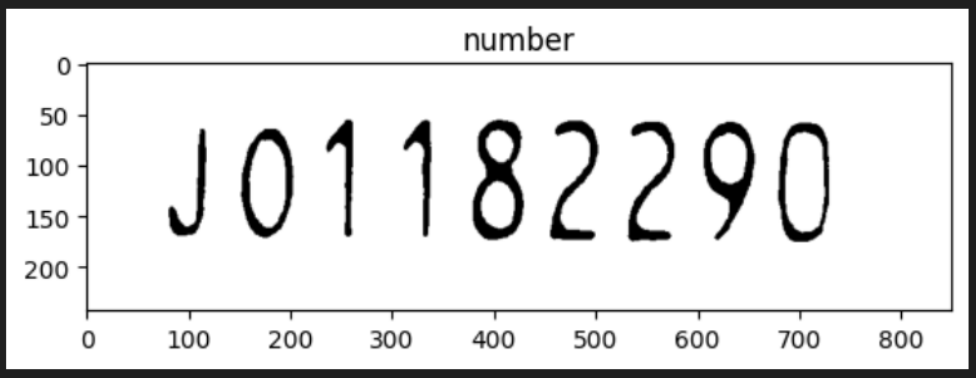

id
٢٩٩٠٥٠٤٠١٠٠١١٥

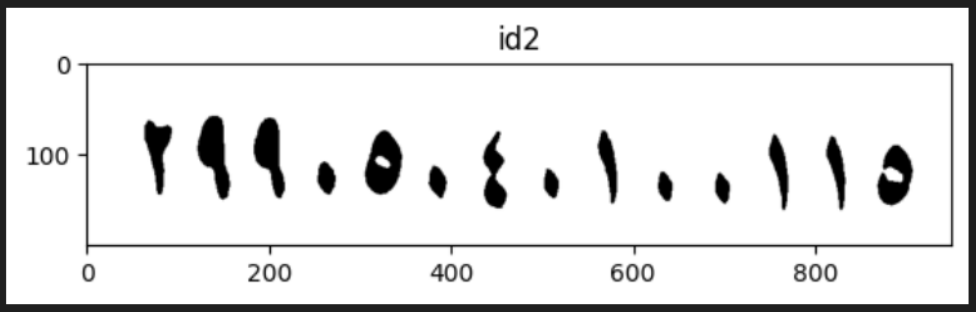

fname
حسام

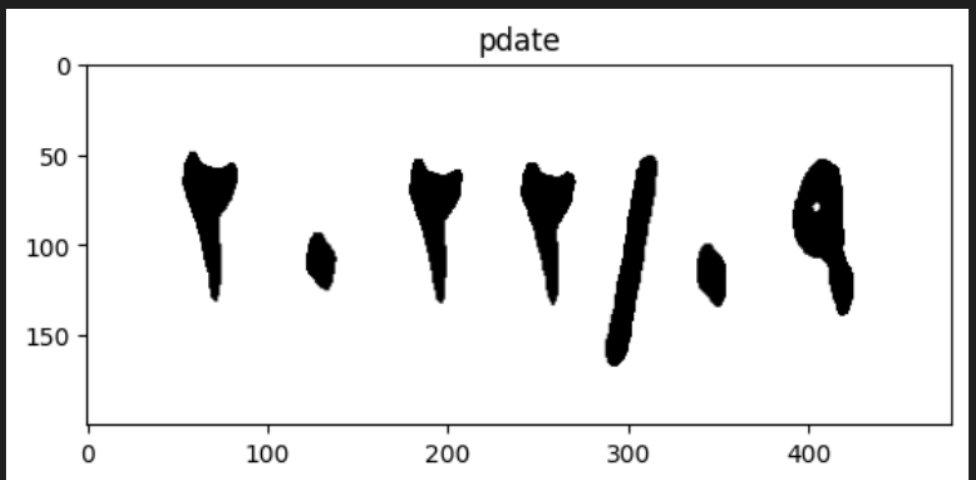

lname
علاءالدين ابراهيم فريد

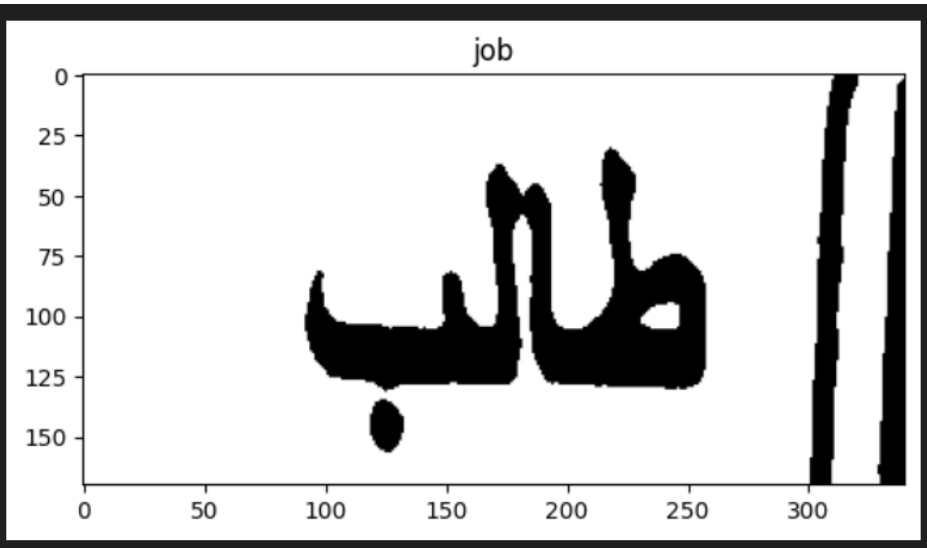

address
١٧ش فلسطين-ش جسرالسويس -عرب الجسر
عين شمس - القاهره

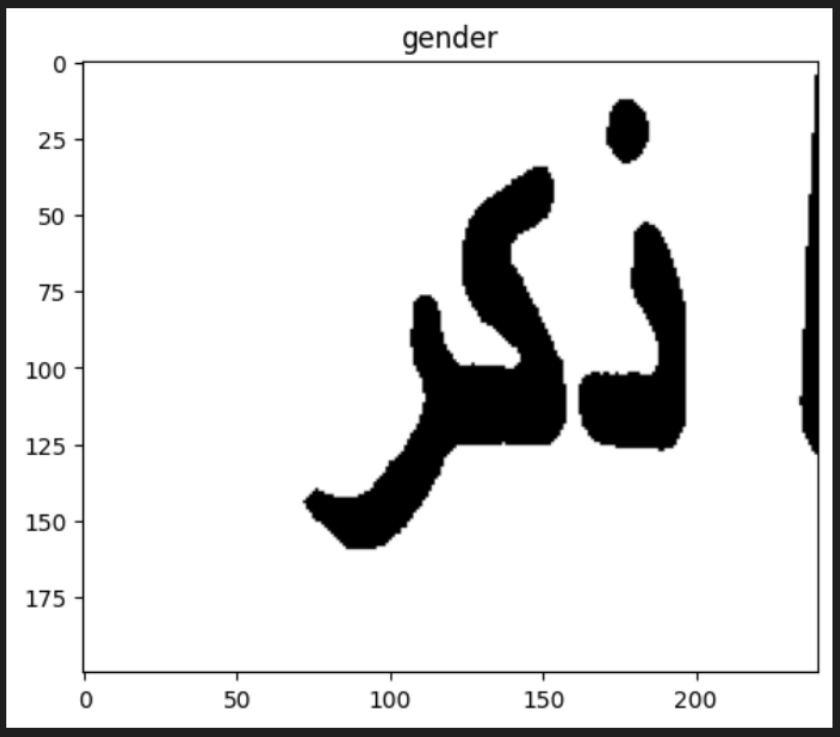

bdate

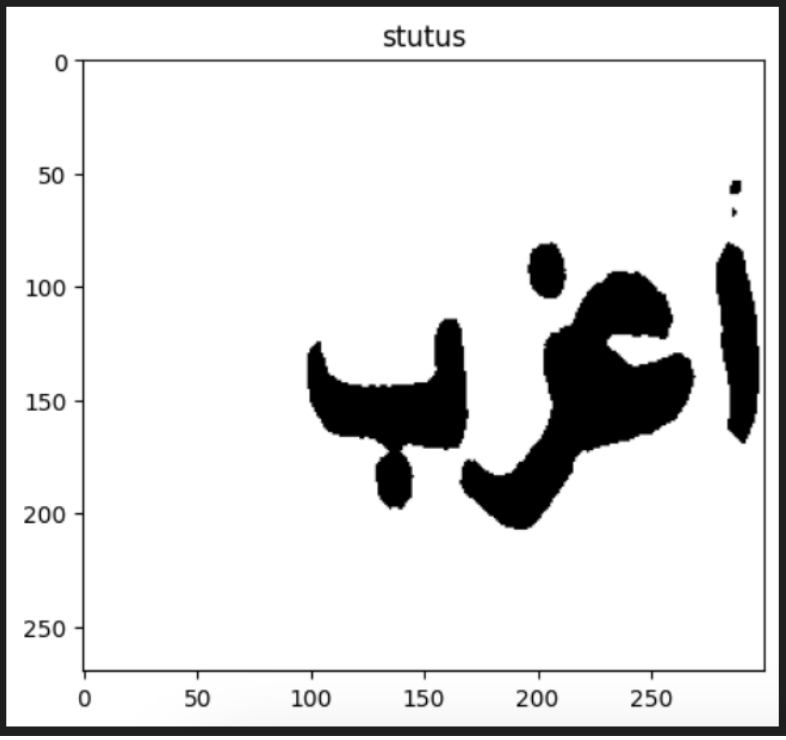

number
J01182290

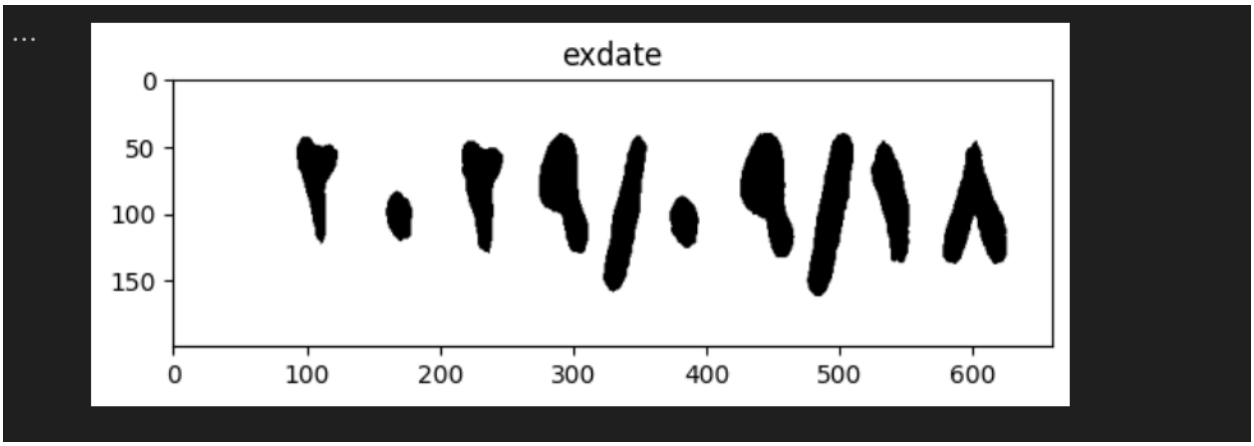

id2
٢٩٩٠٥٠٤٠١٠٠١١٥


pdate
٢٠٢٢/٠٩


job
طالب


gender
ذكر


stutus
اعزب


exdate
0
50
100
150
0
100
200
300
400
500
600