ID Document Scanner

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1 Introduction

The automatic extraction of personal data from scanned ID cards is a crucial task in digital identity verification. With increasing digitalization, industries such as banking, healthcare, and government services require reliable and automated methods to verify identity documents. Traditional manual verification is time-consuming and prone to errors, making image processing based solutions an essential alternative.

This project aims to develop an image processing system to scan and extract key information (name, ID number,date of birth) from identity documents. The system leverages Optical Character Recognition (OCR) and deep learning-based image preprocessing to improve accuracy.

2 Bibliographic Study

To build an ID card scanning system, it is essential to analyze existing methods for personal information extraction using image processing and OCR techniques.

2.1 Personal Information Extraction from ID Cards

This technique involves detecting key regions, such as the Machine Readable Zone (MRZ) and other structural components, from ID card images. Researchers have proposed methods that combine image processing and optical character recognition to accurately extract relevant personal information from identity documents.

2.2 National ID Card Recognition

This approach focuses on leveraging OCR engines along with robust image preprocessing techniques to convert scanned ID card images into structured text. Methods such as grayscale conversion, noise reduction, and template matching have been employed to reliably recognize and extract textual information from national ID cards [6].

2.3 ID Card OCR APIs and Platforms

To optimize the scanning and information extraction process, several commercial solutions can be integrated into a personal project:

- **Dynamsoft OCR SDK**: A solution that combines OCR and barcode recognition to enhance identity verification workflows [1].
- **Nanonets ID Card OCR**: A plug-and-play OCR API for various types of ID cards (driver's licenses, passports, etc.), offering high accuracy and integration flexibility [3].
- **Parseur**: Uses machine learning to extract data from images and PDFs, commonly used in automated Know Your Customer (KYC) processes [4].
- **Quantrium ID-Card Data Extraction**: A deep learning-based platform that extracts not only text but also images (photos, logos) from ID documents [5].

2.4 Computer Vision Approaches Using OpenCV and Python

In addition to the methods discussed above, computer vision techniques using OpenCV and Python have been employed to detect and extract ID card features. An article by FaceOnLive [2] explains how to develop an OpenCV-based ID card detection system, highlighting key steps such as image preprocessing, edge detection, contour extraction, and region of interest identification. The article also discusses the necessary software and hardware setup for such a system, emphasizing the need for high-quality datasets to train the models effectively.

2.5 Other Industry Applications

In addition to the core technologies discussed, ID card scanning is widely used in various industries:

- Digital Driver's Licenses in Mobile Wallets: Allows users to store and verify digital IDs on their smartphones.
- Retail Age Verification and Onboarding: Used for verifying customer IDs in real-time for age-restricted purchases.
- Healthcare Patient Identification: Integrated into hospital check-in systems to enhance security and privacy.
- Government Digital ID Initiatives: Enables citizens to store and use digital copies of identification documents.
- Air Travel Passenger Processing: Airlines implement passport scanning in mobile applications to streamline check-ins.

3 Method

The proposed solution consists of an image processing system that processes a photograph of an identity document and automatically extracts personal information using OCR. The main steps of the method are:

1. **Image Preprocessing** – The image is corrected for lighting using gray-world white balance, deskewed using a hybrid method (Hough lines + text baseline alignment), then converted to grayscale and binarized using an adjusted Otsu threshold.

2. **Perspective Correction** – If a contour corresponding to an ID card is detected, a perspective warp is applied to obtain a standardized, front-facing image. Otherwise, the image is globally resized.

3. **Full Image OCR Detection** – Tesseract OCR is applied to the entire binarized image, highlighting detected words and filtering by a minimum confidence score.

4. **Text Post-processing** – The OCR-extracted text is corrected by replacing commonly misrecognized words and is analyzed to extract fields such as: *name*, *surname*, *ID number (CNP)*, and *date of birth*.

5. **ROI-based Extraction** – Regions of Interest (ROIs) are defined on the image for important fields, and local OCR is applied within each zone to enhance accuracy.

Figure 1 illustrates the general processing workflow.

Figure 1: Processing workflow for extracting data from ID cards

4 Evaluation and Results

The system was tested on a dataset of Romanian ID card images, scanned or photographed under various lighting and tilt conditions. Evaluation was conducted both qualitatively (visually) and quantitatively.

4.1 Visual Results

Convincing visual results were obtained, particularly after preprocessing. In Figure 2, we can see that the ROI zones are correctly detected, and the text is clearly legible.

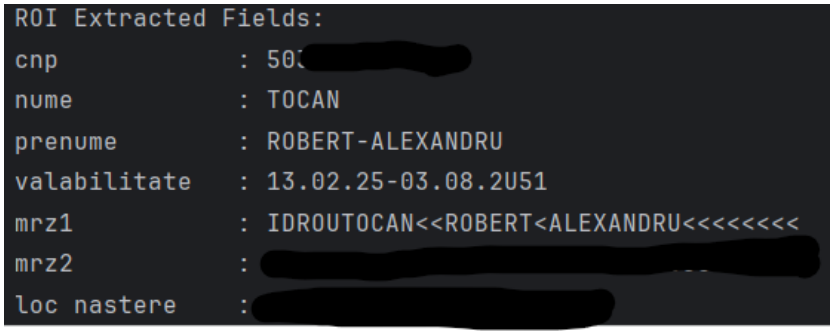

Figure 2: Example of visual ROI extraction and OCR results

4.2 Limitations

The method is sensitive to:

- Completely blurry or highly tilted images
- OCR performance in low contrast areas or with shadows
- ID cards with atypical graphical layouts

5 Conclusion

This project demonstrated that it is possible to automatically extract personal information from identity cards using image processing techniques and OCR. The main contribution consists of implementing a complete processing pipeline, including preprocessing, deskewing, perspective warping, text extraction, and post-processing, as well as combining full-image OCR with ROI-based OCR to improve accuracy.

Potential future improvements include:

- Facial recognition from the ID photo

- Automatic classification of document types (ID, driver's license, passport)
- An automatic validation system for the ID number (CNP)

References

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