

組別 Team ID：202510

專題屬性 Category：多功能網站系統（Website System Design）

專題名稱 Project：Fast INV 智慧辨識系統(Fast invoice Intelligent identification system)

1、指導老師 Advisor：王佳文老師（Prof. Jia-Wen,Wang）

2、組員 Team members：張璦鏞（11114051）、許之冠（11114147）、施昌宏（11114165）、施成霖（11114182）、陳又嘉(11114015)

3、系統環境 System environment：

(1) 軟體 Software：

作業系統 Operating System：Windows10 以上

語言 Programing language：Python3.9 以上、JavaScript

開發工具 Toolkits：Visual Studio Code、Yolov5、Tesseract OCR、FLASK、LabelImg

資料庫軟體 Database Software：MySQL

(2) 硬體 Hardware：

CPU：Intel Core i5 第 8 代 / Ryzen 5 2500U 以上；記憶體：16 GB RAM 顯示器：13 吋以上、解析度 1920×1080（FHD）

4、簡介：

(1) 系統簡述（系統的主要功能）

本系統「Fast INV 智慧辨識系統」結合影像物件偵測與 OCR 技術，提供使用者進行自動化發票管理業務，使用者能直接於電腦或瀏覽器上傳發票，系統即自動完成辨識、擷取與紀錄等資料管理功能。在影像辨識層面，系統採用 YOLO（You Only Look Once）即時物件偵測演算法，搭配 Tesseract OCR（開源光學字元辨識引擎），達成影像區域偵測與文字擷取的整合應用。YOLO 模型能即時偵測並標註發票影像中的關鍵欄位，如發票號碼、日期、金額與統一編號等；Tesseract OCR 則負責將擷取出的影像內容轉換為可編輯文字資料，並透過結構化處理與比對機制確保資料完整性與準確性。同時，系統中的 RPA 程式會模擬人工動作，將 YOLO 與 Tesseract OCR 的辨識結果自動匯入資料庫中完成登錄與歸檔。使用者可於「發票查詢」頁面即時瀏覽歷史紀錄、進行篩選或匯出結果。此外，本平台支援多種常見檔案格式（JPG、PNG、PDF），具備自動轉換與分類功能。辨識結果會即時呈現在前端頁面，並以直覺化介面顯示辨識文字、影像區塊等資訊，使整體操作更流暢與智能化。

(2) 特色（系統的亮點）

● **AI 影像辨識技術：**

系統運用 YOLO 影像辨識技術 搭配 OCR（光學字元辨識）演算法，自動進行廠商分類並擷取發票中的號碼、日期、金額、統一編號等關鍵資訊，大幅降低人工輸入錯誤率，提升資料登錄效率與準確性。

● **自動化管理：**

辨識完成後，系統會自動將發票影像與辨識結果同步儲存至資料庫，使用者可於「發票查詢」頁面即時檢視歷史紀錄，免除重複上傳與重新辨識的麻煩，並提供廠商往來紀錄彙整與金額視覺化統計圖表。

- **多格式支援：**

支援多種常見檔案格式（JPG、PNG、PDF），並可自動壓縮與格式轉換，確保上傳過程穩定順暢，不受檔案大小與格式限制。並支援檔案匯出 CSV 檔案格式，用以未來串接相關平台。

- **操作便利性：**

使用者無須安裝任何應用程式，只需透過網頁瀏覽器即可上傳發票進行辨識。透過 FLASK 網頁設計，使介面呈現更簡潔與直覺，支援單一檔案、多個檔案、資料夾方式上傳與即時進度顯示，讓一般使用者也能快速上手。

5、 Introduction

(1) System Overview (Main Functions)

The “Fast INV Intelligent Invoice Recognition Platform” integrates image object detection and OCR technologies to enable automated invoice management. Users can upload invoices directly from their computers or browsers, and the system automatically completes the processes of recognition, data extraction, and record management. In terms of image recognition, the system adopts the YOLO (You Only Look Once) real-time object detection algorithm in combination with Tesseract OCR, an open-source optical character recognition engine, to achieve integrated detection and text extraction. The YOLO model can instantly detect and label key invoice fields such as the invoice number, date, amount, and company tax ID. Tesseract OCR then converts the extracted image content into editable text data, with structured processing and verification mechanisms ensuring data integrity and accuracy. At the same time, an RPA (Robotic Process Automation) program simulates human operations to automatically import recognition results from YOLO and Tesseract OCR into the database for registration and archiving. Users can browse historical records in real time, apply filters, or export results through the “Invoice Query” page. Furthermore, the platform supports multiple common file formats (JPG, PNG, PDF) and provides automatic conversion and classification. Recognition results are displayed instantly on the front-end interface, showing both detected text and corresponding image regions. This intuitive and intelligent design ensures a smooth and efficient user experience.

(2) Features (System Highlights)

- **AI Image Recognition**

The platform employs a YOLO-based object-detection model combined with OCR algorithms to automatically classify vendors and extract key invoice fields—such as invoice number, date, amount, and tax identification number. This automated pipeline substantially reduces manual entry errors while improving the efficiency and accuracy of data registration.

- **Automated Management**

After recognition, invoice images and their corresponding extraction results are automatically stored in the database. Users can view historical records on the “Invoice Query” page, eliminating redundant uploads and re-recognition. The system also consolidates vendor transaction histories and provides visualized statistical charts for amount summaries.

- **Multi-format Support**

The platform supports common file formats (JPG, PNG, PDF) and performs automatic pre-processing, including compression and format conversion to ensure stable and smooth uploads regardless of file size or format. Export functionality (CSV) is provided to facilitate integration with external systems.

- **Ease of Use**

Users do not need to install any applications; invoices can be uploaded and recognized directly through a web browser. Built with Flask (web framework), the system provides a clean and intuitive interface that supports single-file, multi-file, and folder uploads, along with real-time progress display. This design ensures that even general users can quickly and easily operate the system.