ExamCV

Automation of Exam Results Extraction and Validation Using Computer Vision and Machine Learning

Presented by

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Problem Statement

Manual exam processing is slow and error-prone. Automating student information and grade extraction using OCR and computer vision can solve these issues.

Project Goals & Objectives

- Extract student names, IDs, and scores from scanned sheets.
- Verify the extracted data with an existing database.
- Flag mismatches for review.

End-of-year Examinations, 2024 EMTH271-24S2 (C) / MATH270-24S2 (C)

Family Name _____

First Name _____

Student Number | | | | | | | | |

Venue _____

Seat Number _____

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No electronic/communication devices are permitted.

No exam materials may be removed from the exam room.

Mathematics and Statistics

EXAMINATION

End-of-year Examinations, 2024

EMTH271-24S2 (C) / MATH270-24S2 (C)

Mathematical Modelling and Computation 2

For Examiner Use Only

Question	Mark
Q1	
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	
Q9	
Q10	
Q11	

Total _____

Examination Duration: 120 minutes

Exam Conditions:

Restricted Book exam: Students may bring in the listed approved materials only.

Other - please specify details in the free text box at the end of this form.

Calculators with a 'UC' sticker approved.

No exam materials may be removed from the exam room.

Materials Permitted in the Exam Venue:

Restricted Book exam materials:

One A4 double-sided page of notes - printed/copied/handwritten.

Materials to be Supplied to Students:

1 x Write-on exam paper

Instructions to Students:

Attempt all 11 questions provided.

There is a total of 100 marks.

Write your answers in the spaces provided.

Use black or blue ink only (not pencil).

Explain everything and show all working.

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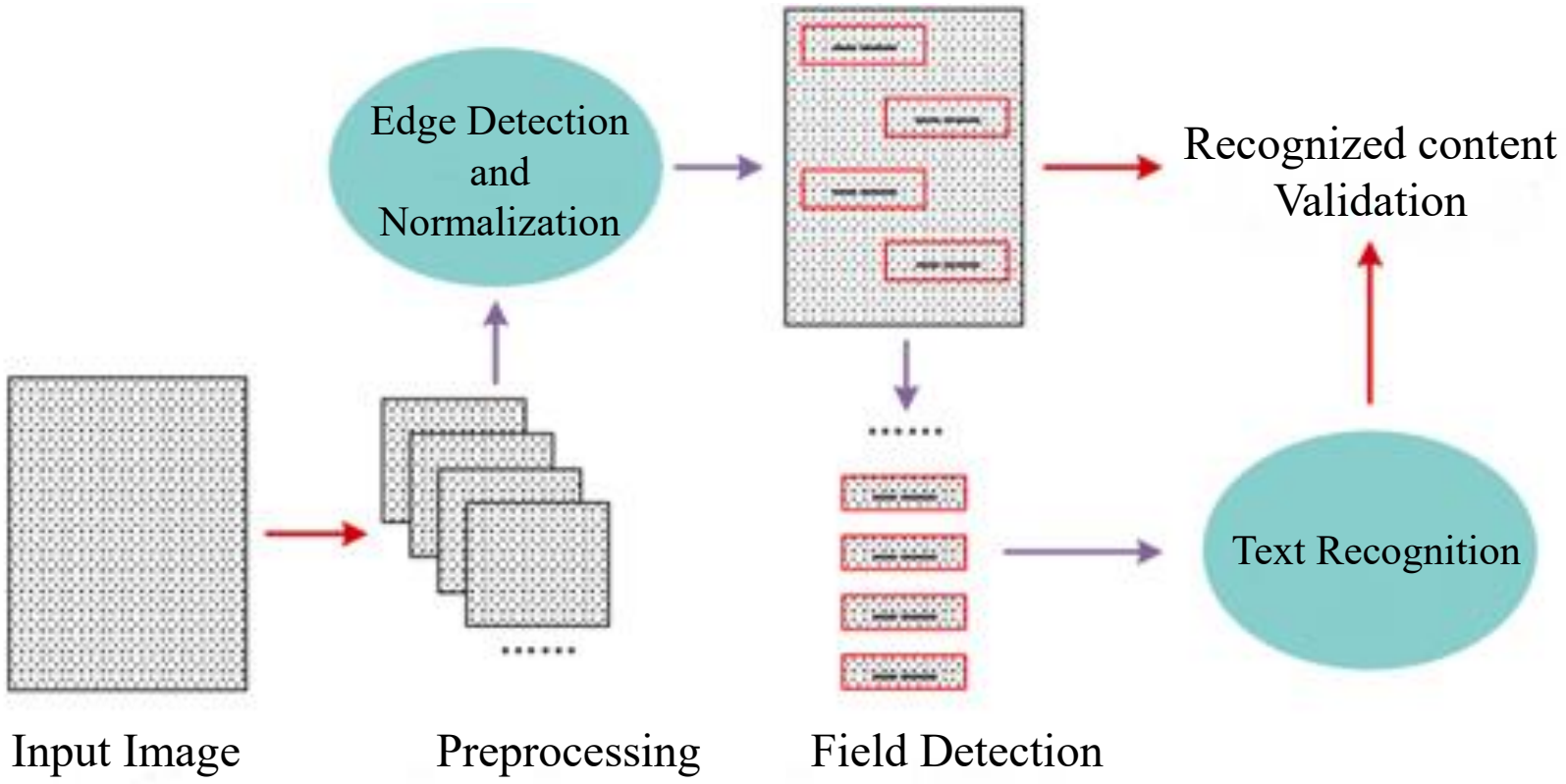
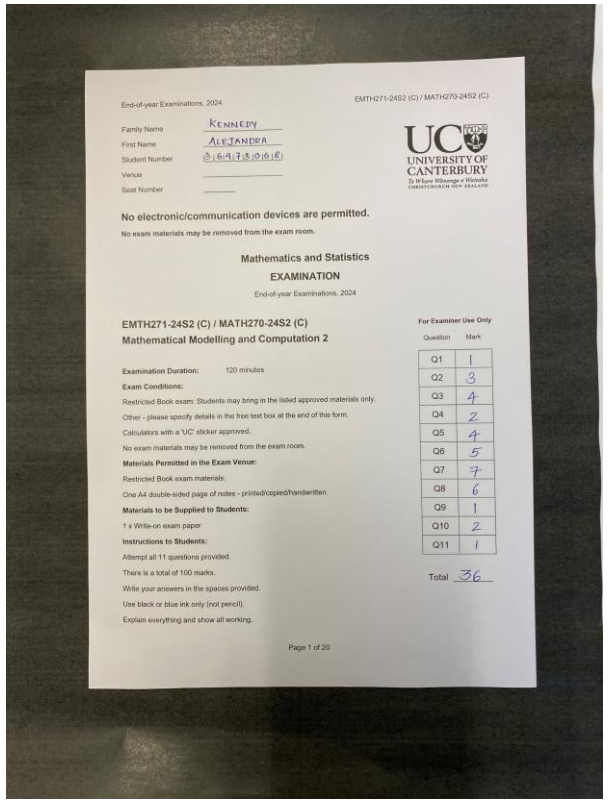
Methodology – How It Works

1. **Image Capture**
2. **Preprocessing**
3. **Field Detection**
4. **Text Recognition**
5. **Validation & Output**

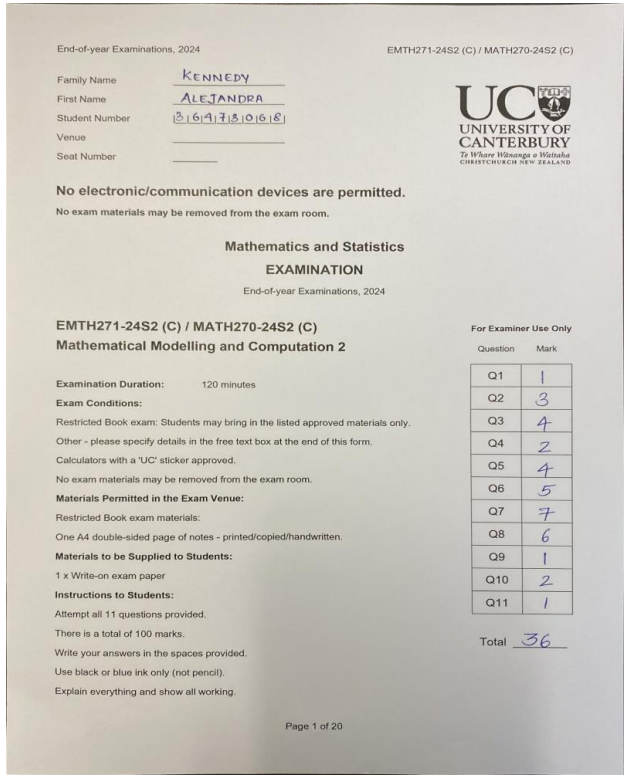


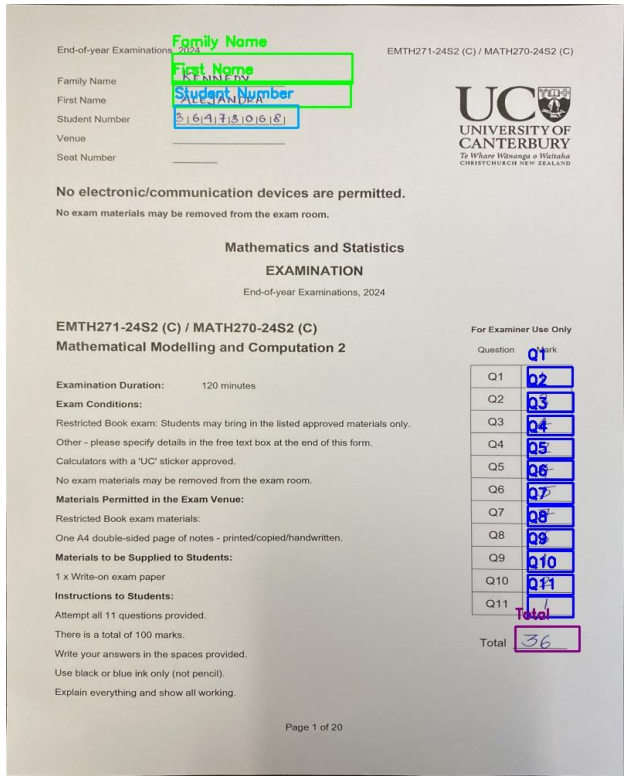
Demo – OCR in Action



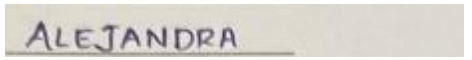
Input Image

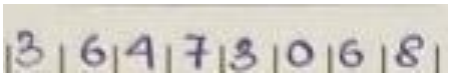
Edge detection & normalization (Background Removal)





Field detection





Handwritten text detection

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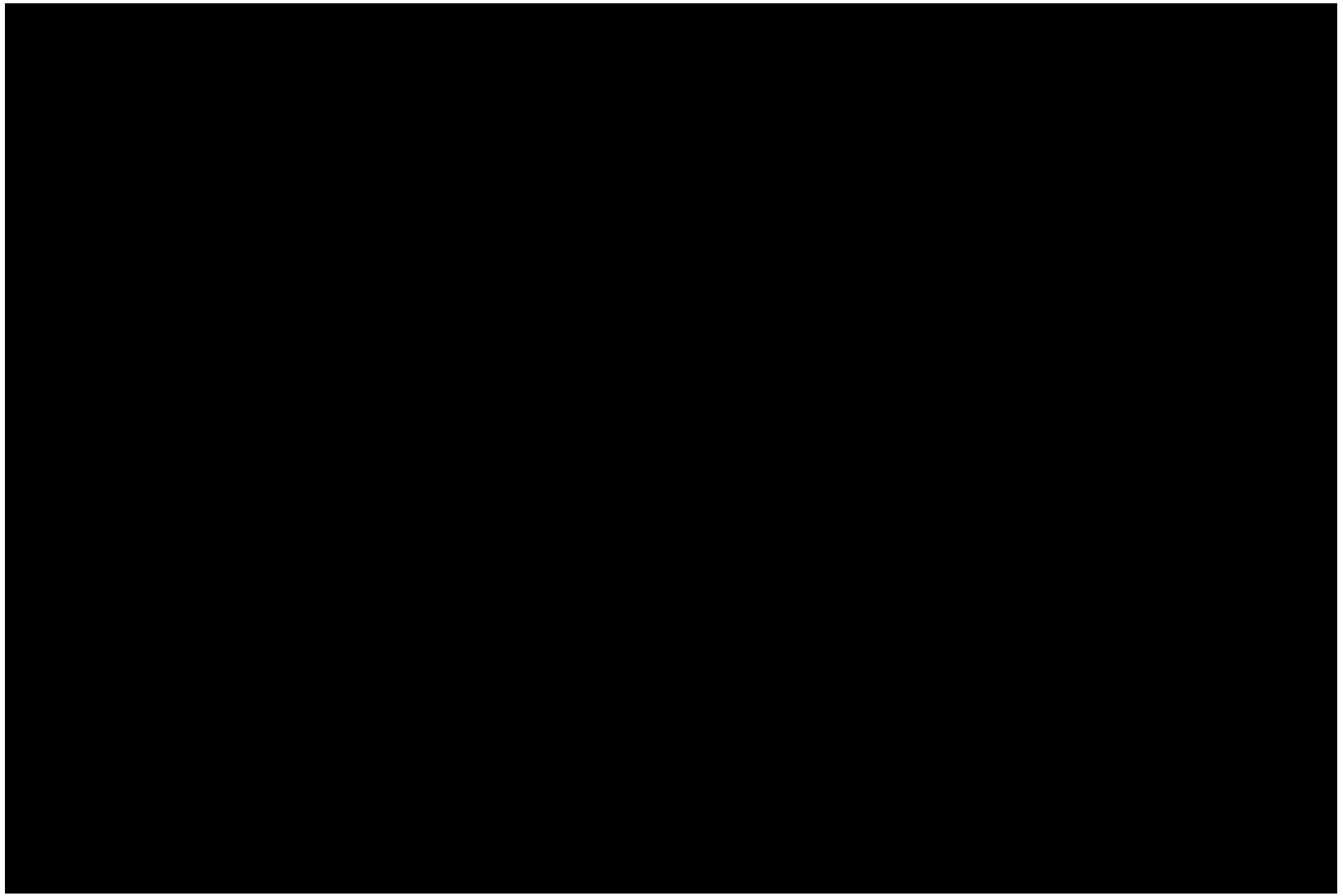
GUI & Usability-Demo



Results & Performance Evaluation

Validation Step	Criteria	Action
Student Name, Student ID	≥ 50% match with database	✅ Approve
Student Name, Student ID	< 50% match	❌ Manual Review
Total Score Check	Sum of question marks = Total Score	✅ Approve
Total Score Check	Mismatch in total	❌ Manual Review

Family Name	First Name	Student Number	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Total Score
KENNEDY	ALEJANDRA	36473068	1	3	4	2	4	5	7	6	1	2	1	36
HARRIS	DAVID	58441817	9	9	9	9	9	9	9	9	9	9	9	99
SHEPHERD	VERONICA	27879846	6	4	8	0	8	1	4	6	3	5	6	52
FLOWERS	SAMANTHA	84251962	3	4	5	1	8	1	2	9	9	8	5	61
OWENS	CHEYENNE	38792956	5	1	3	9	9	2	3	1	5	8	7	64

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Challenges & Future Work

➢ Challenges

- Variability in handwriting recognition.
- Misalignment of scanned images.

➢ Future Enhancements

- Develop advanced AI-based validation.
- Expand for multiple exam formats.

Technology Stack & Tools Used

- **Programming Language:** Python
- **Libraries:** OpenCV, TrOCR, Streamlit
- **Machine Learning:** Transformer-based optical character recognition (TrOCR)
- **Data Processing:** Pandas, NumPy, Faker