**Automatic Question Generation from Handwritten Lecture Notes Using TrOCR Text Recognition**

**and** **T5 Language Processing**

by

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# APPROVAL SHEET

This is to certify that I have supervised the preparation of and read the thesis paper prepared by **Rommel John H. Ronduen** and **Jan Adrian C. Manzanero** entitled **Automatic Question Generation From Handwritten Lecture Notes Using TrOCR Text Recognition and T5 Language Processing** and that the said paper has been submitted for final examination by the Oral Examination Committee.

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As members of the Oral Examination Committee, we certify that we have examined the paper and hereby recommend that it be accepted as fulfillment of the thesis requirement for the Degree Bachelor of Science in Computer Engineering.

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# Chapter 1

**INTRODUCTION**

Handwritten lecture notes are one way for students to visualize and reinforce learning. These learning artifacts contain valuable pieces of information to the learner and may form the basis for other forms of learning materials. One such is the concept of review questions in the form of quizzes, test banks, and flashcards. In the advent of artificial intelligence (AI), education has become one of the primary beneficiaries due to its aid in the formation of learning materials. Creation of review question is involved in this generative AI through a process defined by literature as automatic question generation (AQG). This research is an attempt to allowing for AQG by utilizing handwritten lecture notes as a source for the formation of questions. Using a fine-tuned T5 model and base handwritten version of TrOCR on the Raspberry Pi 5 with spaCy and Rapid Automatic Keyword Extraction (RAKE) for context indexing and the use of the Gemini 1.5 Pro large language model (LLM) for text enhancement, AQG from handwritten lecture notes have become a possibility using web camera captures on said notes.

Much of the implementations take advantage of immediately available sources such as video and programming code, as well as manually transcribed information through user text prompts. Research highlighted the use of the Bidirectional Encoder Representations for Transformers (BERT) and the T5 LLM for AQG. An intersection of the studied AQG implementations is through the capability of extracting a specific context, searching and indexing from it, and consequently generating questions through rule-based methods, statistics, and even through LLMs.

Despite existing implementations of AQG in literature, none have allowed for the use of handwritten lecture notes as a source for the AQG process.

# Chapter 2

**REVIEW OF RELATED LITERATURE**

## Automatic question generation (AQG) and handwritten notes

**Large language models**

**Optical character recognition**

# Chapter 3

**METHODOLOGY**

# 

# REFERENCES

[1] R. M. Crumb, R. Hildebrandt, and T. M. Sutton, “The Value of Handwritten Notes: A Failure to Find State-Dependent Effects When Using a Laptop to Take Notes and Complete a Quiz,” *Teaching of Psychology*, vol. 49, no. 1, pp. 7–13, Jan. 2022, doi: 10.1177/0098628320979895.