



SMART MAINTENANCE SYSTEM WITH QR CODE TRACKING

UNDERGRADUATE THESIS

Submitted as one of the requirements to obtain

Sarjana Komputer (S.Kom)

By:

YAHYA RAFLI HIDAYAH

001202200162

FACULTY OF COMPUTER SCIENCE

INFORMATICS STUDY PROGRAM

CIKARANG

AUGUST, 2025

SIMILARITY INDEX REPORT

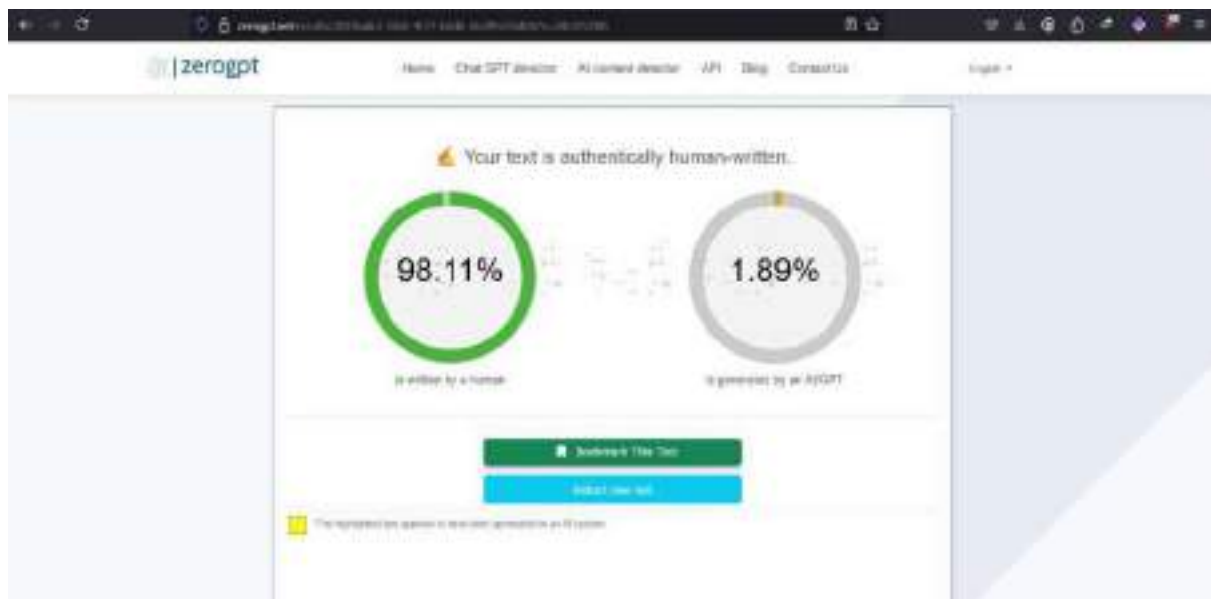
Binarized and Full-Precision 3D CNN for Video Classification Using Distributed Training

ORIGINALITY REPORT

4%	1%	3%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	"ECAI 2020", IOS Press, 2020 Publication	<1%
2	"Neural Computing for Advanced Applications", Springer Science and Business Media LLC, 2020 Publication	<1%
3	Submitted to University College London Student Paper	<1%
4	eprints.usm.my Internet Source	<1%
5	"Pattern Recognition. ICPR International Workshops and Challenges", Springer Science and Business Media LLC, 2021 Publication	<1%
6	Haotong Qin, Ruihao Gong, Xianglong Liu, Xiao Bai, Jingkuan Song, Nicu Sebe. "Binary neural networks: A survey", Pattern Recognition, 2020 Publication	<1%



ABSTRACT

This report details the development and implementation of a **Smart Maintenance System with QR Code Tracking**, a project aimed at improving operational efficiency in businesses that operate across multiple locations. As the front-end developer, my role primarily focused on creating the user interface and ensuring the system was intuitive, responsive, and efficient for technicians and administrators. The solution addresses the challenges posed by fragmented maintenance management, such as inefficient reporting, delayed scheduling, and the lack of effective communication between technicians, managers, and clients.

The system integrates various functionalities including user role management, client and store registration, automated maintenance scheduling, and real-time maintenance reporting via QR code scanning. Technicians scan a store's unique QR code to access store-specific data and submit maintenance reports, enhancing transparency and ensuring accurate record-keeping. Administrators can easily track maintenance schedules, oversee technician performance, and manage customer feedback, all through a streamlined web-based interface.

The development utilized **ReactJS** and **React Native** for the front-end to ensure smooth user interaction on both web and mobile platforms. The system's flexibility allows it to be used across various devices, ensuring that technicians can complete their tasks efficiently, even in areas with poor connectivity. Testing was conducted on various functionalities, including QR code scanning, real-time reporting, and automated scheduling, to ensure the system operates seamlessly across devices.

This project demonstrates how integrating digital solutions can improve the efficiency and accuracy of maintenance management, reduce operational delays, and

enhance customer satisfaction. By transitioning from a manual to a digital approach, the system provides businesses with an automated, transparent, and scalable solution to handle maintenance across multiple locations.

TABLE OF CONTENTS

	Page
ABSTRACT.....	i
DEDICATION.....	iii
ACKNOWLEDGMENTS.....	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
F100.....	1
INTRODUCTION.....	1
1.1 PROBLEM FORMULATION.....	1
1.1.1 Background of the Problem	1
1.1.2 Problem Statement	2
1.1.3 Objective	2
1.1.4 Problems from a Customer Perspective	2
1.2 PROBLEM CONSTRAINT ANALYSIS.....	3
1.2.1 Economics	3
1.2.2 Manufacturability	3
1.2.3 Sustainability	3
1.3 PROBLEM FUNCTIONAL ANALYSIS	4
1.3.1 Functionalities 1: User Role Management System	4
1.3.2 Functionalities 2: Store Registration using QR Code	4
1.3.3 Functionalities 3: Maintenance Reporting via QR Code Scanning	5
1.3.4 Functionalities 4: Automated Maintenance Scheduling System....	5
1.3.5 Functionalities 5: Feedback and Complaint Submission (Client Forum).....	5
1.3.6 Functionality 6: Audit Trail and Notification System.....	5
1.3.7 Functionality 7: Data Export and Reporting	6
1.4 SOLUTION SELECTION	6
1.4.1 Alternative Solution 1	6
1.4.2 Alternative Solution 2	6

1.4.3	Alternative Solution 3	7
1.4.4	Solution Selection	7
1.5	SOLUTION USAGE SCENARIOS	8
1.5.1	Use Case.....	10
1.5.2	Pre-Conditions.....	10
1.5.3	Main Flow	10
1.5.4	Post Conditions	12
1.5.5	Exceptions	13
1.6	DEVELOPMENT EFFORT	13
1.6.1	Man-months	13
1.6.2	Machine-months.....	14
1.6.3	Development tools	15
1.6.4	Test Equipment	16
1.6.5	Expert needs	17
1.6.6	Cost estimation.....	19
1.6.7	Timelines.....	20
1.7	CONCLUSION.....	20
F200		22
Specification		22
2.1	EXISTING AND PROPOSED SYSTEM	22
2.1.1	Existing Business Process	22
2.1.2	Proposed Business Process	23
2.2	GLOBAL DESCRIPTION OF THE PRODUCT	24
2.2.1	Main Functionality	24
2.2.2	User Characteristics	25
2.2.3	Constraints.....	26
2.2.4	Product Development Environment.....	27
2.2.5	Product Operational Environment.....	27
2.3	REQUIREMENT ANALYSIS	27
2.3.1	External Interface	27
2.3.2	Functional Description	29
2.3.3	Data Requirement from user's perspective	34

2.3.4	Functional Requirement from user's perspective	43
2.3.5	Non Functional Requirement	51
2.4	SPECIFICATION TESTING	52
2.4.1	Real-Time System Response.....	52
2.4.2	Platform Availability.....	52
2.4.3	Technician QR Flow Reliability	52
2.4.4	Ease of Use for Admin and Technician Roles	53
2.4.5	Schedule & Report Accuracy.....	53
2.4.6	Security and Access Control	53
2.4.7	Notification Delivery via WhatsApp	54
2.4.8	Reports Submission Success Rate.....	54
F300		55
DESIGN		55
3.1	ALTERNATIVE SOLUTION DESIGNS	55
3.1.1	Alternative Solution 1	55
3.1.2	Alternative Solution 2	58
3.1.3	Alternative Solution 3	61
3.2	RATIONAL/SYSTEMATIC DESIGN	63
3.2.1	COMPARISON TABLE.....	63
3.2.2	QUANTITATIVE SOLUTION SELECTION	65
3.2.3	SOLUTION SELECTION	66
3.3	HIERARCHICAL/ITERATIVE DESIGN	67
3.3.1	Data Flow Diagram Maintenance System.....	67
3.3.2	Data Flow Diagram Client Registration.....	68
3.3.3	Data Flow Diagram Maintenance Report	70
3.3.4	Software Development Life Cycle Agile.....	72
3.3.5	Details of component and libraries used	74
3.3.6	Unified Modelling Language 2.0	81
3.4	VERIFICATION DEMONSTRATION AND PROOF OF DESIGN PROCESS	83
3.5	STANDARDS USED	84
3.6	IMPLEMENTATION AND TESTING PLANS.....	85

3.6.1	Gantt Chart	85
3.6.2	S-Chart	85
F400		87
DESIGN		87
4.1	ALTERNATIVE SOLUTION DESIGNS	87
4.1.1	Functions/Procedure/Class implementation.....	87
4.1.2	Implementation Verification	176
4.2	PRODUCT DISPLAY	176
4.2.1	Software Product Display	176
4.3	COMPONENT COST ANALYSIS.....	194
4.4	MANUAL GUIDE.....	194
4.4.1	System Build Documentation From The Source (Developer Perspective).....	194
4.4.2	System Installation (User Perspective)	202
4.4.3	User Guide Per User Role	203
F500		206
TESTING		206
5.1	FUNCTIONAL TESTING	206
5.1.1	Testing results of every function in the specification (based on PART C in F100, PART C NO.4 in F200, PART D in F200).....	206
5.1.2	Present qualitative testing (questionnaire for Toya Bumi Bersih Employee)	214
5.2	TESTING OTHER SPECIFICATIONS:.....	218
5.2.1	Non-functional specifications such as size, weight, etc., that are included in the document (PART C NO. 5 F200).....	218
5.2.2	A photo/recording of the test is shown in the document.....	222
CONCLUSION		225
REFERENCES		226

LIST OF TABLES

TABLE	Page
Table 1.1 of Exceptions	13
Table 1.2 of Man-months.....	14
Table 1.3 of Machine-months	15
Table 1.4 of Timelines	20
Table 2.1 of User Characteristics.....	26
Table 2.2 of Table: users.....	35
Table 2.3 of Table: audit_trail	36
Table 2.4 of Table : feedback_complaints	37
Table 2.5 of Table : maintenance_reports.....	38
Table 2.6 of Table : maintenance_parts_used.....	38
Table 2.7 of Table : maintenance_report_photos	39
Table 2.8 of table : stores.....	40
Table 2.9 of table : companies	41
Table 2.10 of Table : equipment.....	41
Table 2.11 of table : soft_deletes	42
Table 3.1 of Comparison Table	64
Table 3.2 of Alternative Solution 1.....	65
Table 3.3 of Alternative Solution 2.....	65
Table 3.4 of Alternative Solution 3.....	66
Table 3.5 of Verification Demonstration and Proof of Design Process	84
Table 3.6 of Standard Used.....	85
Table 4.1 of Component Cost Analysis	194
Table 4.2 of Roles and Permission	198
Table 5.1 of Testing results of every function in the specification.....	209
Table 5.2 of Testing results of every function in the specification.....	212
Table 5.3 of Testing results of every function in the specification.....	213
Table 5.4 of Testing Other Specifications	222

LIST OF FIGURES

FIGURE	Page
Figure 1.1 Flowchart.....	10
Figure 2.1 of Existing business process.....	22
Figure 2.2 of Proposed business process	23
Figure 2. 3 Use case diagram of Functional Description.....	30
Figure 2.4 ERD of Data Requirement from User’s Perspective.....	34
Figure 2.5 of Context Diagram	43
Figure 2.6 of Activity Diagram.....	45
Figure 2.7 of Maintenance Report	46
Figure 2.8 of Client Registration	47
Figure 3.1 Diagram level 0 of Alternative solution 1	55
Figure 3.2 Diagram level 1 of Alternative Solution 1	56
Figure 3.3 Diagram level 0 of Alternative Solution 2	58
Figure 3.4 Diagram level 1 of Alternative Solution 2	59
Figure 3.5 Diagram level 1 of Alternative solution 3 (1)	61
Figure 3.6 Diagram level 1 of Alternative solution 3 (2)	62
Figure 3.7 of Data Flow Diagram Level 0.....	68
Figure 3.8 of Data Flow Diagram Level 1	68
Figure 3.9 Data Flow Diagram Client Registration Level 1	68
Figure 3.10 of Diagram Client Registration Level 2	69
Figure 3.11 of Diagram Client Registration Level 3	70
Figure 3.12 of Data Flow Diagram Maintenance Report Level 1	70
Figure 3.13 of Data Flow Diagram Maintenance Report Level 2	71
Figure 3.14 of Data Flow Diagram Maintenance Report Level 3	71
Figure 3.15 of Software Development Life Cycle Agile	72
Figure 3.16 of Activity Diagram of Client Registration	81
Figure 3.17 of Activity Diagram of Maintenance Report.....	82
Figure 3.18 of Gantt Chart	85
Figure 4.1 of js/pages/dashboard.tsx.....	90
Figure 4.2 of js/pages/welcome.tsx.....	93

Figure 4.3 of js/pages/companies.....	96
Figure 4.4 of js/pages/companies.....	99
Figure 4.5 of js/pages/companies.....	101
Figure 4.6 of js/pages/stores	104
Figure 4.7 of js/pages/stores	105
Figure 4.8 of js/pages/stores	108
Figure 4.9 of js/pages/stores	108
Figure 4.10 of js/pages/inventory	112
Figure 4.11 of js/pages/inventory	114
Figure 4.12 of js/pages/inventory	118
Figure 4.13 of js/pages/inventory	119
Figure 4.14 of js/pages/filterQR	121
Figure 4.15 of js/pages/filterQR	124
Figure 4.16 of js/pages/filterQR	127
Figure 4.17 of js/pages/filterQR	128
Figure 4.18 of js/pages/schedules	158
Figure 4.19 of js/pages/schedules	160
Figure 4.20 of js/pages/schedules	161
Figure 4.21 of js/pages/schedules	162
Figure 4.22 of js/pages/feedback	165
Figure 4.23 of js/pages/feedback	167
Figure 4.24 of js/pages/feedback	170
Figure 4.25 of js/pages/users.....	172
Figure 4.26 of js/pages/users.....	175
Figure 4.27 of Software Product Display	176
Figure 4.28 of Software Product Display	177
Figure 4.29 of Software Product Display	178
Figure 4.30 of Software Product Display	179
Figure 4.31 of Software Product Display	180
Figure 4.32 of Software Product Display	182
Figure 4.33 of Software Product Display	183
Figure 4.34 of Software Product Display	184

Figure 4.35 of Software Product Display	185
Figure 4.36 of Software Product Display	186
Figure 4.37 of Software Product Display	187
Figure 4.38 of Software Product Display	188
Figure 4.39 of Software Product Display	189
Figure 4.40 of Software Product Display	190
Figure 4.41 of Software Product Display	191
Figure 4.42 of Software Product Display	192
Figure 4.43 of Software Product Display	193
Figure 5.1 of Real Time Response.....	223
Figure 5.2 of Data Preservation	224