DEVELOPING A TRANSFORMER-BASED APPROACH FOR FUSING INFRARED AND VISIBLE IMAGES FOR IMPROVED OBJECT DETECTION

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF INFORMATICS OF
THE MIDDLE EAST TECHNICAL UNIVERSITY
BY

AYTEKIN ERDOGAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN
THE DEPARTMENT OF INFORMATION SYSTEMS

AUGUST 2023

Developing A Transformer-Based Approach for Fusing Infrared and Visible Images for Improved Object Detection

submitted by **AYTEKIN ERDOGAN** in partial fulfillment of the requirements for the degree of **Master of Science in Information Systems Department, Middle East Technical University** by,

Prof. Dr. Director of Institute _____
Dean, **Graduate School of Informatics**

Prof. Dr. Head of Department _____
Head of Department, **Information Systems**

Assoc. Prof. Dr. Supervisor _____
Supervisor, **Department, School**

Assoc. Prof. Dr. Co-supervisor if Exists _____
Co-supervisor, **Department, School**

Examining Committee Members:

Prof. Dr. Committee Member 1
Department, School _____

Assoc. Prof. Dr. Committee Member 2
Department, School _____

Assoc. Prof. Dr. Committee Member 3
Department, School _____

Assist. Prof. Dr. Committee Member 4
Department, School _____

Assist. Prof. Dr. Committee Member 5
Department, School _____

Date: 28.08.2019

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Surname: Aytekin Erdogan

Signature :

ABSTRACT

DEVELOPING A TRANSFORMER-BASED APPROACH FOR FUSING INFRARED AND VISIBLE IMAGES FOR IMPROVED OBJECT DETECTION

Erdogan, Aytekin

M.S., Department of Information Systems

Supervisor: Assoc. Prof. Dr. Supervisor

Co-Supervisor: Assoc. Prof. Dr. Co-supervisor if Exists

August 2023, 15 pages

English abstract here

Keywords: A keyword, another keyword, some other keywords

ÖZ

TÜRKÇE BAŞLIK

Erdogan, Aytekin
Yüksek Lisans, Bilişim Sistemleri Bölümü
Tez Yöneticisi: Doç. Dr. Supervisor
Ortak Tez Yöneticisi: Doç. Dr. Co-supervisor if Exists

Ağustos 2023, 15 sayfa

Türkçe öz buraya

Anahtar Kelimeler: Bir anahtar kelime, başka bir anahtar kelime, başka anahtar kelimeler

To the memories of my beloved friends Murat Tekin and Ragip Enes Katran

ACKNOWLEDGMENTS

Acknowledgments here

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

IF	Image Fusion
VIF	Visual and Infrared Image Fusion
AI	Artificial Intelligence
CNN	Convolutional Neural Networks
GAN	General Adveserial Networks

CHAPTER 1

INTRODUCTION

Image Fusion is a computer vision task that has been taken place for many years. Gathering all the complementary usefull informations into single image is called image fusion, *a.k.a* IF. Visual and Infrared Image Fusion, *henceforth will be referred to as VIF*, is a subfield of iamge fusion. Since the first study [**?**] in 1989, VIF is actively studied. In the era of AI, new methods such as CNN, GAN, auto-encoder, transformers are also applied to the VIF problem.

1.1 Research Questions

1.2 Contributions of the Study

1.3 Organization of the Thesis

CHAPTER 2

RELATED WORK

In this chapter, related studies are given in detail.

2.1 Related Work Section I

CHAPTER 3

USER EXPERIMENT

In this chapter, the details of the user experiment are presented.

3.1 Research Method and Experiment Design

CHAPTER 4

USER EXPERIMENT

In this chapter, the details of the user experiment are presented.

4.1 Research Method and Experiment Design

CHAPTER 5

CONCLUSION AND FUTURE WORK

REFERENCES

[1] A. Toet, L. J. Van Ruyven, and J. M. Valeton, "Merging thermal and visual images by a contrast pyramid," *Optical engineering*, vol. 28, no. 7, pp. 789–792, 1989.

APPENDIX A

TABLES FOR RELATED WORK CHAPTER

A.1 Summary of the Studies

APPENDIX B

EXTRA MATERIAL

APPENDIX C

INSTRUMENTS AND ETHICAL CLEARANCE