INTELLIGENT HOMICIDE INVESTIGATOR:

A UNIQUE HOMICIDE CRIME SCENE INVESTIGATION AND DATA COLLECTION TOOL USING CONVOLUTIONAL NEURAL NETWORK

इंटेलिजेंट होमिसाइड जांचकर्ताः कन्वोल्यूशनल न्यूरल नेटवर्क का उपयोग करते हुए एक अनोखा हत्याकांड अपराध स्थल की जांच और डेटा संग्रह उपकरण

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Thesis
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By

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2024

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I**, NEHA VORA D/O SHRI HANSRAJ GUPTA** resident of E-501, Shiv Manthan CHS, Chincholi Bunder Road, Malad West, MUMBAI- 400064, hereby declare that the research work incorporated in the present thesis entitled **"Intelligent Homicide Investigator: A Unique Homicide Crime Scene Investigation and Data Collection Tool Using Convolutional Neural Network"** (इंटेलिजेंट होमिसाइड जांचकर्ता: कन्वोल्यूशनल न्यूरल नेटवर्क का उपयोग करते हुए एक अनोखा हत्याकांड अपराध स्थल की जांच और डेटा संग्रह उपकरण) is my original work. This work (in part or in full) has not been submitted to any University for the award of a Degree or a Diploma. I have properly acknowledged the material collected from secondary sources wherever required.

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CERTIFICATE

It gives me immense pleasure in certifying that the thesis **"Intelligent Homicide Investigator: A Unique Homicide Crime Scene Investigation and Data Collection Tool Using Convolutional Neural Network"** (इंटेलिजेंट होमिसाइड जांचकर्ता: कन्वोल्यूशनल न्यूरल नेटवर्क का उपयोग करते हुए एक अनोखा हत्याकांड अपराध स्थल की जांच और डेटा संग्रह उपकरण) and submitted by **NEHA VORA** is based on the research work carried out under my guidance. He / she have completed the following requirements as per Ph.D. regulations of the University;

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ACKNOWLEDGEMENT

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DATE: -   **NEHA VORA**

DEDICATED TO
MY FAMILY, FRIENDS
AND WELL-WISHERS

PREFACE

The complex nature of crime scene investigations, particularly in cases involving homicides, has always presented numerous challenges to law enforcement agencies worldwide. From scattered physical evidence to the need for accurate victim identification, investigators are often faced with the monumental task of piecing together crucial details from what appears to be a chaotic scene. In such situations, forensic photography plays a vital role, allowing investigators to document the scene visually and analyze the crime from multiple perspectives. Yet, despite the importance of these photographs, human limitations frequently impede the investigation process. Even the most experienced investigators can overlook key details or struggle to process the vast number of images needed to form a coherent narrative.

This is where the inspiration for this research stems from. The traditional methods of documenting and analyzing crime scenes, while essential, are time-consuming and prone to human error. Recognizing the growing importance of technology, I became fascinated with the potential of artificial intelligence (AI) to transform the way forensic investigations are conducted. The idea of utilizing object detection and facial recognition technologies to assist investigators seemed not only plausible but essential in today's rapidly digitizing world.

In this work, I propose an intelligent evidence detection and collection system using a convolutional neural network (CNN) architecture, which aims to reduce the burden on forensic teams by automating the process of crime scene analysis. By detecting critical objects such as weapons, bottles, knifes, etc and by identifying victims through facial recognition, this system is designed to accelerate investigations and improve their accuracy. The ultimate goal of this research is to provide law enforcement with a tool that can aid in early identification of crucial evidence, help in reconstructing the sequence of events at a crime scene, and ensure that justice is served with greater efficiency.

The scope of this study goes beyond the technical aspects of forensic science. It delves into the human element—the limitations we face in complex investigations and

the ways technology can bridge these gaps. The proposed system not only addresses the time-consuming process of manually reviewing images and making logs, but also ensures that no detail, no matter how minute, is missed during analysis. In particular, this model has the potential to revolutionize homicide investigations, where the early identification of a victim can be the key to solving the case swiftly. This research is the culmination of a deep-seated curiosity about the intersections of technology and criminal justice. It reflects years of study, experimentation, and a dedication to finding innovative solutions to long-standing problems in forensic science. It has been a journey shaped by both technical challenges and the invaluable support of my mentors, colleagues, and peers. Their guidance and insights have been instrumental in the development of this model, and I owe them a great debt of gratitude.

I also wish to acknowledge the profound impact of recent advancements in AI and machine learning, without which this work would not have been possible. Technologies like You Only Look Once (YOLO) for object detection and convolutional neural networks have opened new doors in the field of image analysis, and this research seeks to build upon these foundations to create a system that can directly impact criminal investigations in real-world scenarios.

As I present this work, I am filled with optimism about the future of forensic science. The integration of AI into crime scene analysis not only offers a way to enhance the precision and speed of investigations but also promises to reduce the emotional and mental strain on investigators. I hope that this research will serve as a stepping stone for further innovations, encouraging continued exploration of how technology can augment human capabilities in solving complex crimes. It is with great pride and a sense of responsibility that I offer this contribution to the field, with the hope that it will help bring about more effective and efficient investigations, ultimately leading to swifter justice for victims and their families.

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