MAKERERE UNIVERSITY

SCHOOL OF COMPUTING AND INFORMATICS TECHNOLOGY

GROUP 210 EVE

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RESEARCH METHODOLOGY
CONCEPT PAPER

ON

COMPUTER VISION FOR PHYSICAL SECURITY

1 Introduction

Computer vision is an interdisciplinary field that deals with how computers can be made for gaining high-level understanding from digital images or videos. From the perspective of science and engineering, it pursues to automate tasks that the human visual system can fix.[**?**] And in the Subdomains of computer vision in relation to security include; scene reconstruction, event detection, video tracking, object recognition, object pose estimation, motion estimation, and image restoration among others.

Physical security is often a second thought when it comes to information security and since physical security has technical and administrative elements, it is oftenly overlooked because most organizations focus on technology-oriented security countermeasures [Harris, 2013] to prevent hacking attacks. The computer vision system will be designed for the protection of personnel, hardware, software, networks and data from physical actions and events that could cause serious loss or damage to an enterprise or company.

1.1 Background to the problem

Computer vision as a discipline that has made a significant impact on a number of diverse application domains eg [Grimson, 1994] and it has been around since the 1960s.

Beginning from the seventies through the nineties, computer vision started proving its practical value in a wide range of diverse application domains including medical diagnostics,manufacturing, environmental monitoring, space exploration, and military systems such as automatic target recognition, precision weapons, reconnaissance[Trivedi, 2010] and currently its at an extraordinary point in its development.

Physical security over the past decades has become increasingly more difficult for organizations. Technology and computer environments now allow more compromises to occur due to increased vulnerabilities. USB hard drives, laptops, tablets and smartphones allow for information to be lost or stolen because of portability and mobile access. In the early days of computers, they were large mainframe computers only used by a few people and were secured in locked rooms [Harris, 2013]. Today, desks are filled with desktop computers and mobile laptops that have access to company data from across the enterprise. Protecting data, networks and systems has become difficult to implement with mobile users being able to take their computers out of the facilities. Fraud, vandalism, sabotage, accidents, and theft are increasing costs for organizations since the environments are becoming more complex and dynamic [Harris, 2013].

1.2 Problem Statement

With the essence and urge of Protecting data, networks and systems for which has become difficult to implement due to technological advancement that has seen mobile users able to take their

computers out of the facilities, fraud, vandalism, sabotage, accidents, and theft are increasing costs for organizations since the environments are becoming more complex and dynamic with the curent tech trend characterised with limited memory that cannot even remember a quickly flashed image,thus prompting new innovations in terms of computer vision systems for enhancing physical security.

1.3   purpose

To develop method that enable a machine to understand, analyze, process and acquire digital images, videos and extraction of high-dimensional data from the real world in order to produce numerical or symbolic information that is used for the protection of personnel, hardware, software, networks and data from physical actions and events that could cause serious loss or damage to an enterprise, agency or institution.

1.3.1   Objectives

1. To collect data on the current existing systems

2. To analyze the data collected and generate requirements

3. To design and implement the proposed system

4. To test and validate the system.

2   Literature review

In the late 1960s, computer vision began at universities that were pioneering artificial intelligence. It was meant to mimic the human visual system, as a stepping stone to endowing robots with intelligent behavior. What distinguished computer vision from the predominant field of dispensation at that time was a desire to extract 3D structure from images with the objective of achieving full scene understanding. Studies in the 1970s formed the early foundations for many of the computer vision algorithms that exist today, including extraction of edges from images, labeling of lines, non-polyhedral and polyhedral modeling, representation of objects as interconnections of smaller structures and motion estimation among others which were encompassed in the security measures of day to today era making preliminary investigations literally conclusive hence reduction in high security risks and threats.
The next decade saw studies based on more laborious mathematical analysis and quantitative aspects of computer vision which include concepts like;

1. Scale spacing i.e. shading

2. Texture and focus among others

3   Methodology

provides the students best idea on how to conduct the research and analyze the data. The goals and objects identified in previous sections of the Concept Paper should relate to the research methods described in this section. For the Concept Paper, the methodology is simplified or summarized as discussed by

References

[Grimson, 1994] Grimson, W.E.L., . J. M. (Mar. 1994). Computer vision applications. *Communications of the ACM*, pages 45+.Academic OneFile, Accessed 11 Apr. 2017.

[Harris, 2013] Harris, S. (2013). Physical and environmental security. *In CISSP Exam Guide*, pages 6th ed., pp.427–502 USA McGraw–Hill.

[Trivedi, 2010] Trivedi, M. (2010). Computer vision for homeland security. *University of California.*