Computer Vision for Physical Security

Computer Vision: tasks include methods for acquiring, processing, analyzing and understanding digital images, and extraction of high-dimensional data from the real world in order to produce numerical or symbolic information, e.g., in the forms of decisions.

Physical Security: 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. This includes protection from fire, flood, natural disasters, burglary, theft, vandalism and terrorism.

Objectives

 is to develop methods that enable a machine to “understand” or 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.

Introduction

Computer vision is at an extraordinary point in its development and it has been around since the 1960s, but only recently has it been possible to build useful computer systems using ideas from computer vision.

There are a number of important applications of computer vision, one is in medical imaging: one builds software systems that can enhance imagery, or identify important phenomena or events, or visualize information obtained by imaging. Another is in inspection: one takes pictures of objects to determine whether they are within specification. A third is in interpreting satellite images, both for military purposes (a program might be required to determine what militarily interesting phenomena have occurred in a given region recently; or what damage was caused by a bombing) and for civilian purposes (what will this year’s maize crop be? How much rainforest is left?) A fourth is in organizing and structuring collections of pictures.

*Computer vision provides a way for systems to understand how to make intelligent decisions about their environment based on sensory inputs, but vision systems only receive measurements of reflected brightness as input. An understanding of how objects are mapped into image brightness is required to convert brightness into world measurements. Generating an image from a set of scene parameters is well defined, but inverting an image to compute the scene parameters that generated it requires that many parameters be deduced from inverting a single number.*

*Successful computer vision applications often mix two different effects; among these are vision inspection, assembly and material handling, automatic target recognition, photo interpretation, and extraction of three-dimensional structure. Several current and future computer vision applications are*

*Reference*

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Background

Problem Statement (physical security)

* limited memory-cannot remember a quickly flashed image
* limited to visible spectrum (The **visible spectrum** is the portion of the electromagnetic **spectrum** that is **visible** to the human eye. Electromagnetic radiation in this range of wavelengths is called **visible** light or simply light.)
* illusion (thing that is or is likely to be wrongly perceived or interpreted by the senses.)

Specific objectives

* To collect data on the current existing systems/ computer vision application.
* To analyze the data collected and generate requirements
* To design and implement the methods/system
* To test and validate the system.