

Eye with Intelligence

Connecting CCTV to Big Data, Hadoop and R

Vishal Mehta¹

¹ Mphasis Limited
Cyber City, Tower IV,
Magarpatta City , Hadapsar
Pune

Abstract

Security, an abstraction which creates a virtual boundary and gives the sense of separation between the asset and the threat. It provides a layer of protection to the asset by encapsulating it and just making visible the necessary details to the outside world. In this paper we are trying to implement a system which makes the CCTV (Closed-Circuit Television) connect to more powerful technologies like Big Data and Hadoop which removes the human monitoring efforts by making the system automated and self-reporting in order to reduce crime rate and provide an action just by observing the attributes of malicious behavior by introducing the notion of SAAS (Security as a Service).

Keywords: ICCTV (Closed Circuit Television), OCCT (Open Circuit Television), DVR (Digital Video Recorder).

1. Introduction

In this paper we are trying to redefine the concept of CCTV (Closed-Circuit Television) to OCCT (Open-Circuit Cloud Television) in which the CCTV cameras record the video and directly stream in the video on to the cloud for the real time processing . This cloud is installed with the framework which is capable to monitor the behavior of the specific in the mass and report as threat in real time. In this way system steps in to make the assets more secure and provide an action alert before the mishap takes place by its system intelligence.

2. EXISTING SYSTEM

2.1 Classical System

In this there are number of CCTV camera's installed in various different locations. These camera's record the video in their raw form and send it to some specific place where this specific place is a control room. The control room is installed with the television and a 24*7 human effort is required in order to monitor the video feed as shown in the Fig 1.

2.2 DVR based systems

In this types of systems the recorded video feed is directly dumped in to the DVR and then these are responsible to store the data for hundreds of hour's and again the recording is opened as per need in order to monitor the malicious behavior as shown in Fig 2..

2.3 IP based cameras

In this type of the CCTV systems the IP based cameras are used which are directly connected to remote servers in the network attached storage. Again these recordings done by the IP cameras are stored in the NAS and depend upon the human being in order to monitor the video as shown in Fig 3.

All the above systems continuous involvement of human effort and with the help of the data sets analysis of US crime y the help of R (Statistical analysis of these raw feeds of data) we can easily identify what level of security we can achieve from the existing system of security and try

to answer some basic questions. How secure we are? How can we more secure? And make the world more safe place to live.

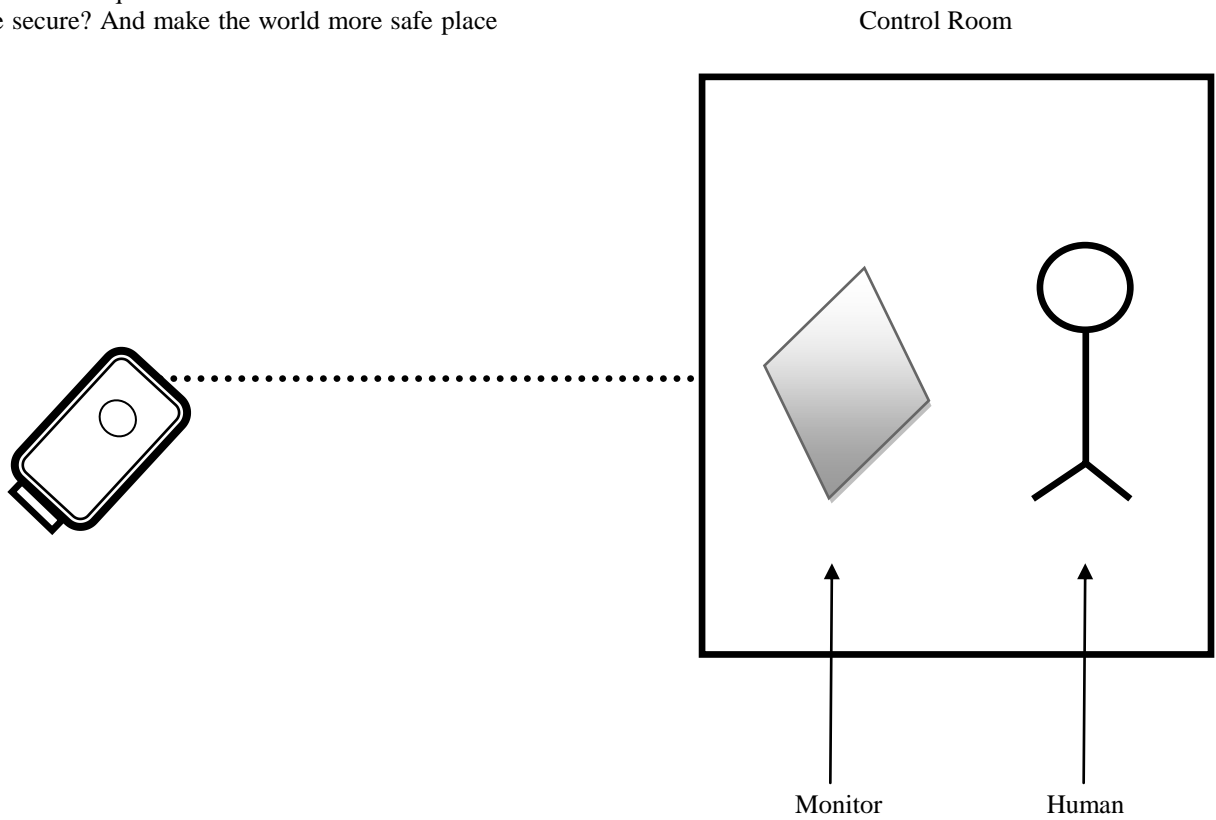
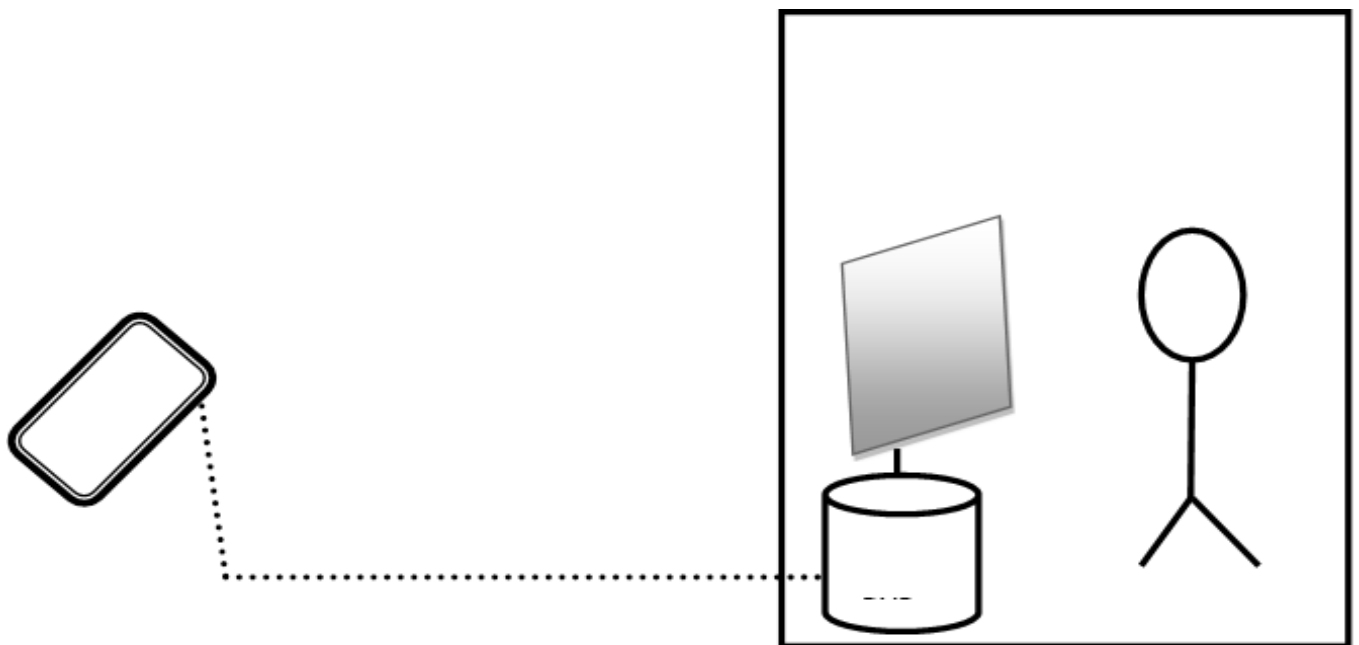


Fig 1.



F Fig 2.

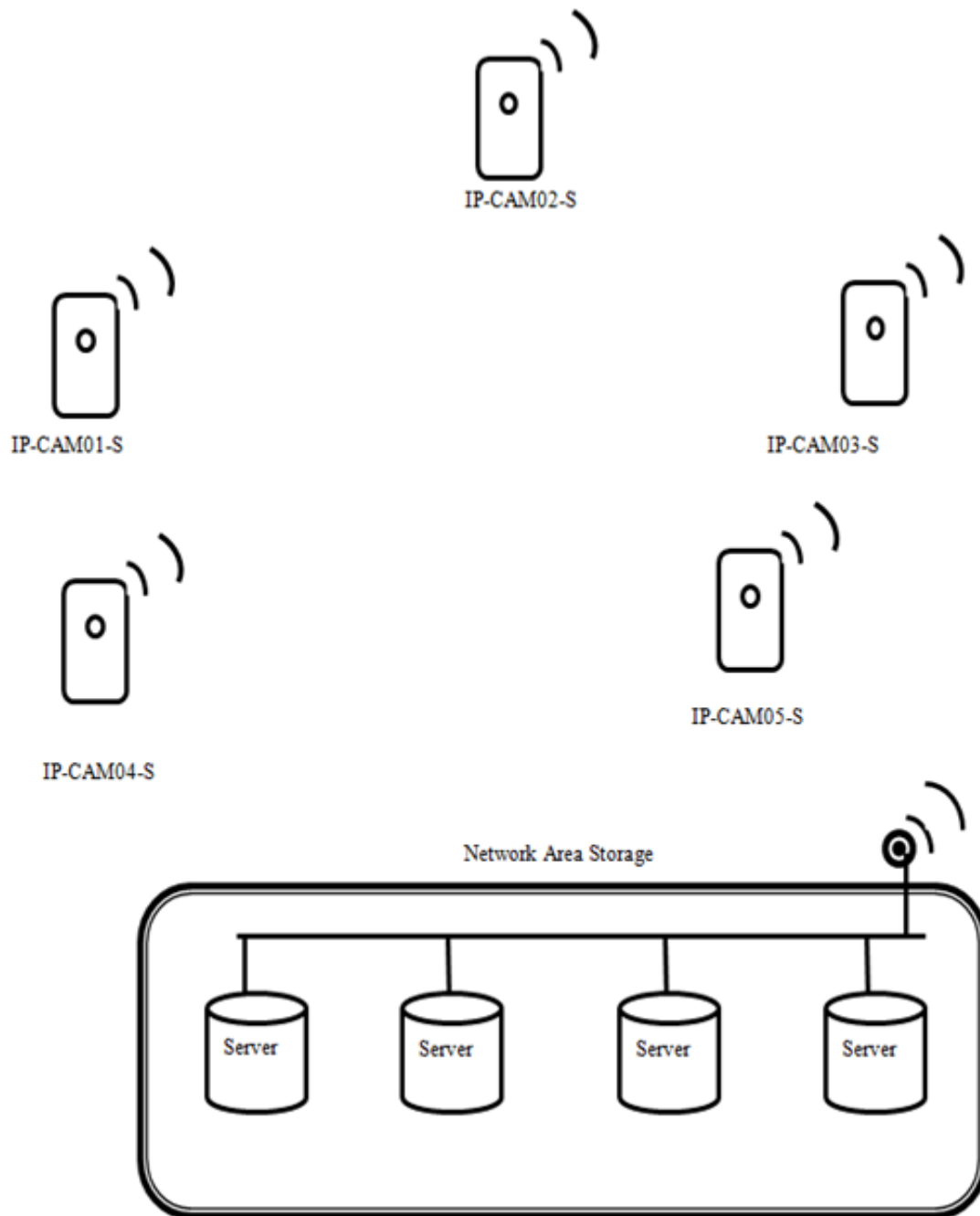


Fig 3.

3. SECURITY AS A SERVICE

Today world has a great buzz of cloud computing where things are with notion X as a service (XAAS) where

X = Anything.

In our system we are trying to implement

X = Security

In this the cameras can be installed in some location. The cameras will produce the continuous raw video feed which gets directly uploaded to the cloud with the help of network. This video feed gets scooped into various nodes in the same rack or on the different racks in the same cluster in Hadoop HDFS (Hadoop Distributed File System).

In all the different nodes we have map reduce algorithms which analyses the video on all the nodes parallel on all the nodes as video content analysis. If any mal behavior found in the video then an immediate alert is fired by the system on the same instant.

Since the video feeds can come multiple geographical areas the Big Data comes into the rescue to store so much of the data and provide a real time analysis to the video parallel on multiple nodes to make the system faster. As we can see this with the help of diagram in Fig 4.

3.1 Working

The entire video gets divided into multiple slots. These slots are sent to different nodes in order to process. The map reduce processes the video slot on that node frame by frame and compares to the centralized criminal database to find the threat with the help of face recognition system and if the threat is found then the threat is registered in the threat record on the different node on the same cluster with all the details of the geographical location of the video captured, threat details etc.

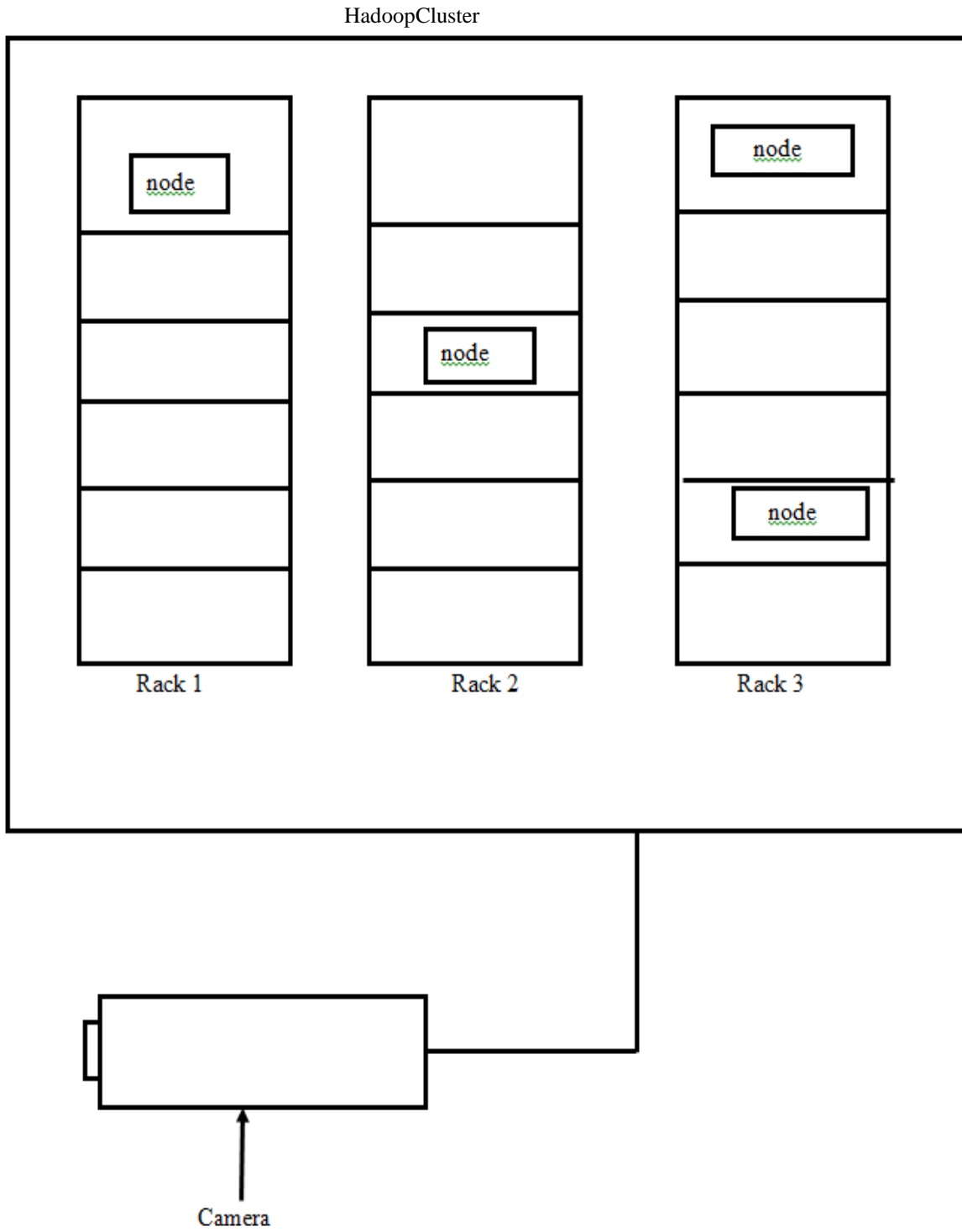


Fig4

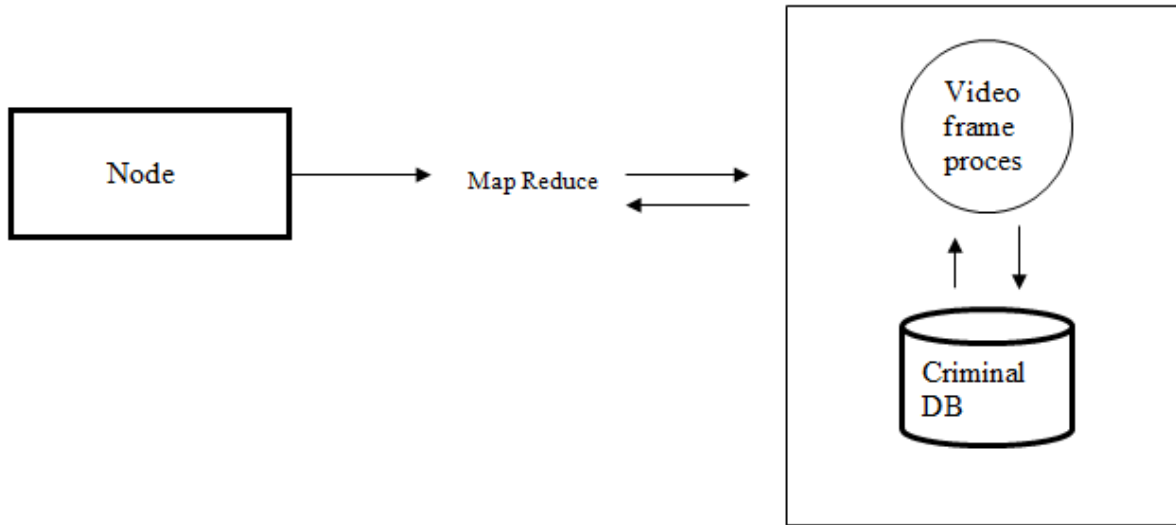


Fig 5.

4. CONCLUSIONS

The resulting system helps in real time identification, analysis and remedy to fix up the criminal issues and to response to the challenging notion to define a fix before the crime takes place. The real time statistical analysis of the data produced by these systems will be an eye opener and will be in the position to define the hot geographical areas responsible for crimes.

Acknowledgments

I would like to thank Mr. Venkat Suresh, Mr. Shailesh Kulkarni and Mr. Suraj C. Kothari in order to make always taking up the challenging idea to bring them to reality and always are the source of inspiration.

References

- [1] Big data: The next frontier for innovation, competition, and productivity.
- [2] Understanding big data: Analytics for enterprise class Hadoop and streaming data
- [3] Understanding car parks, crime and CCTV by Nick Tilley.
- [4] Surveillance, Closed Circuit Television and Social Control.
- [5] Jason Surveillance of Public Space: CCTV, Street Lighting and Crime Prevention