**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**BELAGAVI-590018, KARNATAKA**



**LONG SYNOPSIS**

**ON**

# “Public Event Crowd Management”

**Submitted by**

KINSHUK KUMAR(1CR20IS0082)

KRISHNA KANT GUPTA(1CR20IS084)

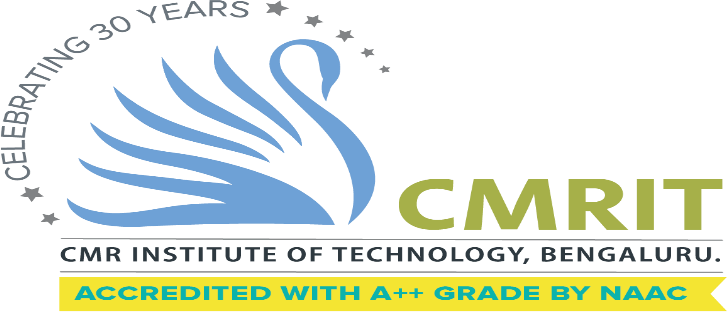
MOHIT ABHISHEK(1CR20IS094)

**Under the guidance of**

Dr. Ciyamala Kushbu S

Assistant Professor

Department of Information Science and Engineering

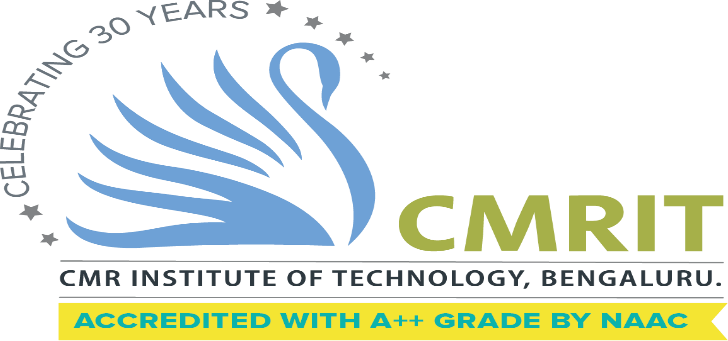


## DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

#132, AECS LAYOUT, IT PARK ROAD, KUNDALAHALLI, BENGALURU-560037

**AY 2023-24**

**7th SEMESTER, PROJECT PHASE – I (18CSP77)**



## DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

***Certificate***

This is to certify that the long synopsis entitled, **“Public Crowd Event Management”,** prepared by Mohit Abhishek (1CR20IS094), Krishna Kant Gupta(1CR20IS084), Kinshuk Kumar (1CR20IS082) the bonafide students of CMR Institute of Technology in partial fulfillment of the requirements for the award of **Bachelor of Engineering in Information Science & Engineering** of the Visvesvaraya Technological University, Belagavi - 590018 during the academic year 2023-24.

It is certified that all the corrections and suggestions indicated for Internal Assessment have been incorporated in the synopsis deposited in the departmental library. The synopsis has been approved as it satisfies the academic requirements prescribed for the said degree.



**Signature of Guide Signature of HOD**

**Dr. Ciyamala Kushbu S Dr. Farida Begam**

**Assistant Professor Professor & HOD**

**Dept. of ISE, CMRIT Dept. of ISE, CMRIT**

**Abstract**

Crowd monitoring is a common phenomenon observed during major events such as concerts, festivals, sports, games, and entertainment. Crowd is a group of people gathered in a certain location. In the context of this project, the term ‘event’ refers to some situation of relatively high crowd density. The term ‘event’ not only is a representation of the general perception of any external situation like public rallies, religious gatherings but also the fact that some natural and man-made factors can also affect for instance road blockage could be attributed to construction work and/or weather conditions, illegal vehicle parking which occupies a significant portion of area reserved for pedestrians. Crowd management at public events is a multifaceted challenge, demanding a seamless blend of technology, data analysis, and real-time response coordination. In the context of ensuring the safety, security, and convenience of event attendees, the project aims at implementing an intelligent system that should be capable of real-time crowd monitoring, behavior analysis, and response coordination to prevent overcrowding, mitigate risks, and enhance the overall event experience.

**Chapter 1**

* 1. **Introduction**

Crowd analysis and monitoring is a challenging problem to ensure public safety and security. A huge crowd of people visit public places seasonally. Crowd management is critical in these situations in order to ensure public safety and maintain law and order. In the context of this project, the term ‘event’ refers to some situation of relatively high crowd density. The term ‘event’ not only is a representation of the general perception of any external situation like public rallies, religious gatherings but also the fact that some natural and man-made factors can also affect crowd density for instance road blockage could be attributed to construction work and/or weather conditions, illegal vehicle parking which occupies a significant portion of area reserved for pedestrians. The immediate effects lead to traffic diversion resulting in change of crowd flow, problems related to noise pollution etc. In a densely crowded area, crowd behavior is an important parameter for monitoring crowds and ensuring proper law and order. Anomaly detection is one such key area which helps in meeting our objective to a great extent with communication alerts and emergency measures in situations of suspicion. Anomaly detection in crowds is not a full fledged measure of an activity of suspicion as it involves taking other parameters into consideration for instance a panic at traffic signal is not the same as in a bank.

* 1. **Project Objective**

**Security and Surveillance:**

* Anomaly detection in crowded scenes can significantly enhance security and surveillance systems. It can help identify suspicious or abnormal behavior in real-time, enabling early detection of potential threats or criminal activities.

**Transportation and Infrastructure:**

* Monitoring crowded transportation hubs, such as airports, train stations, or bus terminals, can be crucial for ensuring smooth operations and passenger safety. Anomaly detection can help identify unusual or abnormal crowd behaviors that may indicate congestion, security breaches, or other issues requiring intervention.

**Crowd Control and Safety:**

* Anomaly detection technology can be applied to ensure crowd control and safety in public spaces, including city centers, parks, or tourist attractions. It can help monitor crowd density, detect overcrowding situations, and identify potential safety risks or emergencies in real-time.

**Event Management:**

* Anomaly detection can be valuable in managing large-scale events, such as concerts, festivals, or sports games. It can help organizers identify and respond to crowd-related incidents, such as overcrowding or potentially dangerous situations, improving crowd safety and overall event experience.
  1. **User Persona:**
* Security personnel, surveillance operators, or facility managers.
  1. **Technologies Used:**

**Integrated Development Environment**

* **Google Colaboratory**:

Runtime Environment- GPU/TPU Enabled

**Jupyter Notebook**- running locally on CPU

**Kaggle Kernels**

**Libraries and Framework:**

* Keras, TensorFlow, OpenCV, NumPy, scikit-learn, FFmpeg.

**Datasets:**

* [Avenue Dataset](https://www.cse.cuhk.edu.hk/leojia/projects/detectabnormal/dataset.html) **, UCSD Dataset**

**Machine Learning Techniques:**

* CNN, Autoencoder, Deep SORT.

**CNN Architecture:**

* YOLO, MDT model

**Data Processing and Storage:**

* Image Processing, Numpy Array Files(.npy**)**

**Video Processing:**

* FFmpeg
  1. **Approach:**

**Data Preprocessing:**

* Extract frames from training videos using FFmpeg and convert them to grayscale.
* Create a temporal sequence of frames (bunches) to capture the spatiotemporal information.

**Feature Extraction:**

* Feature extraction algorithms, including deep learning methods like Convolutional Neural Networks (CNNs) for spatial features and optical flow for motion information in video data

**Data Visualisation:**

* Visualization tools like Matplotlib and/or real time visualizations for enhanced comprehensions.

**Model Training:**

* Design a Convolutional Neural Network (CNN) architecture, specifically a spatiotemporal autoencoder, using Keras and TensorFlow.
* Train the model on the preprocessed data, aiming to learn normal crowd behavior.

**Model Evaluation:**

* Evaluate the trained model's performance using metrics like mean squared loss.

**Abnormality Detection:**

* Apply the trained model to new videos (testing) by preprocessing the frames similarly

**Results Analysis:**

* Analyze the output to determine if the model successfully detects anomalous events.

* 1. **Dataset:**

The Avenue Dataset for training and testing. This dataset likely contains videos of crowded scenes.

**Chapter 2**

# EXISTING SYSTEM AND PROPOSED SYSTEM

* 1. **Existing system**
* There exists specific approaches for different use case requirements with crowd monitoring
* The detection of pushing/non-pushing behavior in crowds uses a novel state of the art CNN technique(VBnet) for this purpose.
* Other methods include optical flow and convolutional encoder which is used in surveillance methods
  1. **Proposed System**
* Implementing this project proves to be economically beneficial for the organization. It provides a cost-effective solution for crowd monitoring, ensuring public safety, and managing gatherings efficiently.
* Utilizing machine learning models on the Crowd monitoring dataset, the system predicts crowd behavior based on motion pattern, body gestures and classifies them as a cluster for anomaly detection
* The two-part web interface offers an exploration segment for detailed methodology and analysis and an interaction component with an interactive dashboard for real-time crowd detection and monitoring.
* To enhance customization, the system integrates the Google API for route planning and the OpenWeatherMap API for live weather conditions.
* This comprehensive approach, combining machine learning, data analysis, and real-time information, aims to provide a safer and more informed travel environment for users.
  1. **Objective of the project**

The objective of the project is to detect deviations from normal crowd behaviors in densely crowded environments. The motivation behind this objective is the prevalence of camera surveillance systems, the challenges in modeling crowd behaviors, and the importance of automatic crowd monitoring for various applications.

**Plan of Implementation**

| **Task** | **Division of work** | **Estimated date of Completion** |
| --- | --- | --- |
| Front-End Development &Database(npy) | MOHIT ABHISHEK | 05 - 03 - 2024 |
| Back-End Development | KINSHUK KUMAR | 28 - 03 - 2024 |
| Machine learning | KRISHNA KANT GUPTA | 30 - 02 - 2024 |
|  |  |  |
|  |  |  |