

Applicant's Name	KONDURU PALLAVI				App. No.	*1			
Field of Study *Mark one field.	<div> <div>CS</div> <div>SY</div> <div>CN</div> <div>IT</div> <div>SE</div> <div>PM</div> </div>								
Prospective Research Adviser	Name				Seal or Signature *2				
	RAGE UDAY KIRAN								
	Recommended Conversion Courses *3								
	<div> <div>CV1</div> <div>CV2</div> <div>CV3</div> <div>CV4</div> <div>CV5</div> <div>CV6</div> <div>CV7</div> <div>CV8</div> </div>								

Research Plan

Write in English within two pages. The entry fields can be expanded.

Title/Research Subject

Deep Learning-Based Traffic Congestion Detection and Prediction Using Real-Time Video Data

Background/Related Works

Traffic congestion is a significant issue in urban areas, leading to delays, increased fuel consumption, and environmental pollution. Traditional traffic monitoring systems rely on sensor-based or manual methods, which may not be scalable or cost-effective. Recent advancements in computer vision and deep learning have enabled automated traffic analysis using video data. Previous studies have applied object detection models and tracking algorithms to count vehicles and estimate congestion levels. However, improving accuracy in real-time congestion analysis and reducing computational complexity remains a challenge. This research aims to leverage DL techniques for efficient traffic congestion estimation using video data.

Objectives/Expected Contributions

- Develop a system that collects real-time traffic video data using a camera.
- Apply machine learning algorithms for object detection and vehicle counting.
- Analyse traffic density and congestion patterns using real-time data.
- Provide insights for traffic management through congestion estimation models.
- Improve the accuracy of congestion detection compared to traditional methods.

Approach/Methodology

Data Collection:

- Capture video footage using a fixed camera setup in selected traffic locations.
- Store collected video data for processing and analysis.

Data Preprocessing:

- Extract frames from video for analysis.
- Enhance video quality using denoising and stabilization techniques.
- Annotate and label vehicles for training and validation.

Object Detection and Tracking:

- Implement YOLOv8 for real-time vehicle detection.
- Use tracking algorithms to track vehicle movement.

Vehicle Counting and Congestion Analysis:

- Count vehicles moving in different directions using a tracking algorithm.
- Categorize congestion levels based on vehicle density and movement patterns.

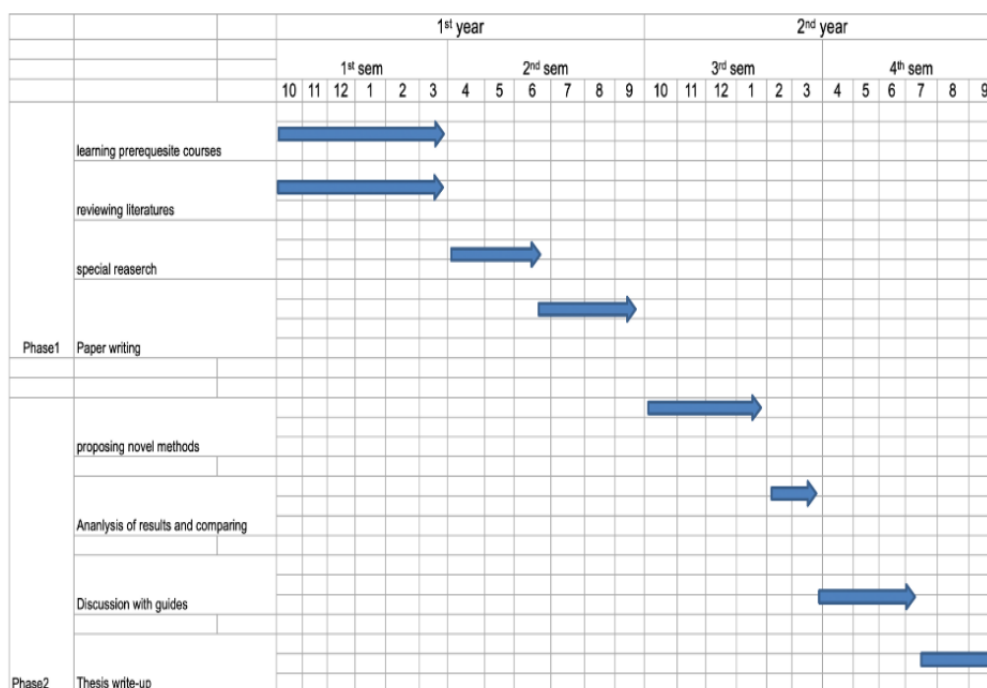
Machine Learning Model for Congestion Prediction:

- Train an ML model using traffic data and detected congestion levels.
- Consider factors like vehicle count, time of day, and weather conditions.
- Evaluate model performance using real-time video data.

Implementation and Real-Time Monitoring:

- Deploy the system for real-time congestion estimation.
- Develop a dashboard to visualize congestion levels.
- Provide insights for transportation authorities to improve traffic management.

Timeline



*1 Leave the "App. No." field blank.

*2 *3 Prior to making an application, **it is necessary to personally obtain approval from your prospective research adviser** (and recommendations for conversion courses as required) regarding the research plan.

If you are in a remote place and not able to obtain a seal or a signature, a copy of an email that verifies their agreement should be attached.

Conversion Courses

CV1	Logic Circuit Design	CV5	Algorithms and Data Structures
CV2	Programming Languages	CV6	Formal Languages and Compilers
CV3	Operating Systems	CV7	Database Management Systems
CV4	Computer Architecture	CV8	Computer Graphics