

CSC 790: Graduate Seminar

Assignment 03

Student Name: Prajwol Tiwari

Student ID: 101144638

1) Discuss the following:

- a. Motivation
- b. Problem
- c. Methodology
- d. Data and results
- e. Take home message.
- f. Scalability and generalizability of the method

Answers:

A: This research article aims to analyze the need for image analysis and machine learning in the area of vehicular communication in order to create a smart vehicular communication system. The article seeks to demonstrate how a panoramic picture can help improve the driving experience by evaluating a collection of images shared by several vehicles at any specific event in the specific vehicular network. The author wants to convey how a smart vehicular communication system that uses image analysis and machine learning has the potential to change communication by allowing the sharing of critical information. A smart vehicular communication system has the ability to improve road safety, decrease traffic congestion, and provide an overall better driving experience for both drivers and passengers. Thus, the author wants to convey that the development of this system is a critical area of study that has the potential to revolutionize how we communicate in a vehicular network.

B: The issue addressed in the study article is the need for improved vehicular communication using big data. The author seeks to highlight upon the problem of poor communication between automobiles on the road, especially in circumstances where visible communication would be beneficial, like at blind junctions or when maneuvering around unforeseen road dangers or obstructions. The article specifically addresses the challenges connected with sharing and analyzing image data in vehicular networks. The paper suggests a proof-of-concept prototype that shows how images shared by multiple vehicles in a network can be used to create a panoramic view of a specific event using image analysis and machine learning techniques. The ultimate objective is to improve the driving experience by providing critical information for vehicle/user authentication, safety, and security. The paper contends that by using images instead of conventional single-valued data, more complete and useful information can be shared among vehicles in a network. The paper also discusses the difficulties of dealing with large amounts of image data and suggests a framework for analyzing hundreds of images to extract relevant information for sharing among vehicles.

C: This study's methodology is extremely fascinating and special. The paper's author suggests a technique that uses image stitching to create panoramic pictures from front and back cameras in a vehicle communication network for additional analysis. Finding steady Harris points, using SIFT descriptions to create point correlation between two images, and using RANSAC to compute homograph following the matched points are all steps in the process. In order to stitch together pictures and generate panoramic images for further study, the author uses a variety of methods and tools, including SIFT descriptors and RANSAC algorithms. The article also makes recommendations for using roadside units (RSUs) for data verification, image analysis methods for locating images in a series based on similarity scores, and local key points and image matching for stitching images together and producing panoramic images. The suggested approach entails calculating similarity ratings for each pair of pictures in the vehicular network, determining whether the pairs came from the same event, and using approved images to create panoramic images. The number of pictures in the collection determines the grade of the panoramic image, and by using the verification method, fake or fraudulent images can be prevented.

D: The article provides the findings of investigations performed to evaluate the suggested methodology for vehicular communication using images. Images of cars taken by front and rear cameras in a simulated setting make up the dataset used for the tests. In the tests, panoramic pictures are created using image stitching methods and then analyzed and communicated between cars. The outcomes demonstrate the efficacy of the suggested approach in producing panoramic pictures with high resolution and precision. Strong and trustworthy panoramic pictures are produced by using the SIFT, SURF, and RANSAC algorithms for image alignment and stitching as well as feature recognition and matching. The experiments show how well the suggested approach works for locating and tracking cars in a network of vehicles communicating with one another. The overall findings of the studies confirm the viability and efficiency of the suggested approach for image-based vehicle communication. According to the paper, the suggested approach has the potential to increase the security and effectiveness of vehicle communication networks by delivering detailed and precise visual data that can be consulted for situational awareness and decision-making.

E: In the study article "Let Vehicles Talk with Images for Smart Vehicular Communication System," an innovative approach for vehicular communication using images is suggested. The author contends that image-based communication, which can be conveyed via visible light communication or infrared communication, may replace conventional communication techniques. The suggested system makes use of cameras that are placed on moving vehicles to record and send pictures of the nearby area. These images are then analyzed using computer vision algorithms to extract pertinent information like traffic signals, road signage, and other vehicles. The benefits of this technique include its speedy transmission of large quantities of information, resilience to interference, and adaptability to both interior and outdoor settings. The author does admit that there are still a number of issues that need to be resolved, such as creating effective picture compression and transmission methods and making sure that the communicated data is secure and private. However, the author is of the opinion that image-based communication holds great promise for revolutionizing vehicle communication and enhancing the security and effectiveness of transit systems. The author does admit that there are still a number of issues that need to be resolved, such as creating effective picture compression and transmission methods and making sure that the communicated data is secure and private. However, the author is of the opinion that image-based communication holds great promise for revolutionizing vehicle communication and enhancing the security and effectiveness of transit systems.

F: In the article "Let Vehicles Talk with Images for Smart Vehicular Communication System," an innovative way of automotive communication using images is suggested. This method has the potential to increase the security and effectiveness of transportation systems. Although the article doesn't specifically address the method's scalability and generalizability, the suggested system is made to function in a range of settings, including both interior and outdoor ones. The author also proposes that the image-based communication system may be combined with other forms of communication, suggesting the possibility of expansion and integration with current communication networks. Although more investigation may be required to completely assess the method's scalability and generalizability, the suggested system offers a hopeful means of enhancing vehicular conversation.