




# GRAPH THEORY

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is light green. They are set against a dark blue background with diagonal lines.

# A STUDY ON APPLICATION OF FUZZY GRAPHS IN TRAFFIC



# ABSTRACT

In this project fuzzy graph is used to represent a traffic network of a city and discussed a method to find the different type of accidental zones in traffic flows using edge coloring of a fuzzy graph and also analyzing the same traffic flow pattern for five road junction using edge coloring.



# INTRODUCTION

- ★ Graph theory is the study of graphs which are mathematical structures used to model pairwise relations between objects.
- ★ Graph theory plays an important role in many fields like communication network in coding theory, electronic circuits in electrical engineering, DNA double helix, etc.,
- ★ Graph coloring is one of the most important concepts in graph theory.
- ★ **Azriel Rosenfeld** introduced fuzzy graph in 1975.



# BASIC DEFINITIONS

- Directed graph
- Bi partite graph
- Complete graph
- Simple graph
- Crisp
- Crisp set
- Fuzzy graph
- Chromatic number
- Graph coloring
- Multi graph




# FUZZY TRAFFIC CONTROL

Automatic control of traffic signals based on a stochastic model has long been in use in many cities. Simulations of an alternative approach that makes use of fuzzy heuristic control rules have shown significantly improved delay times over the conventional methods of control. These fuzzy control algorithms mimic the protocol used by a human operator to decide the time intervals of opposing green lights.



# APPLICATION OF FUZZY GRAPHS IN TRAFFIC

A graph is a convenient way of representing information involving relationships between objects. The objects are represented by vertices and relations by edges. In many real world problems, we get partial information about that problem. So there is vagueness in the description of the objects or in its relationships or in both. To describe this type of relation, we need to design graph model with fission of type 1 fuzzy set. This fission of fuzzy set with graph is known as fuzzy graph.



In this paper, traffic flow is represented as fuzzy graph problem. Consider a traffic flow shown in fig 4.1. Each arrow in fig 4.1 indicates the vehicles will go from one direction to another direction. But number of vehicles in all paths are not always equal. Due to this reason, we consider it as fuzzy set whose membership value depends upon vehicle number. If the number of vehicles in any path is high, then its membership value will be high and if the number of vehicles in any path is low, then its membership value will be low.



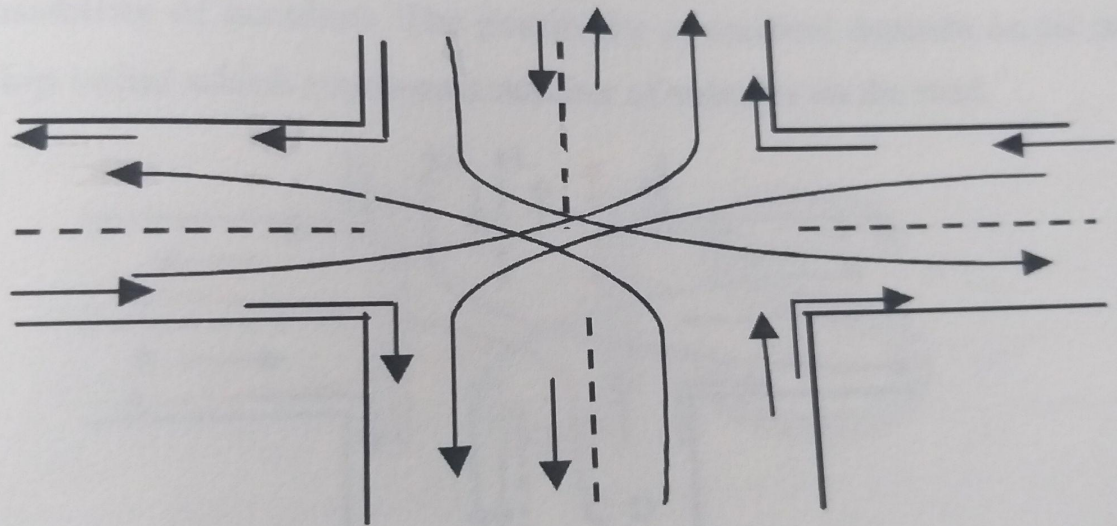



Fig 4.1




Since the four right turns do not interfere with the other traffic flows, they can safely be dropped from the discussion. If the number of vehicles in any path is greater than 10000 per hour then consideration of the membership value of that path is high. If the number of vehicles in any path is greater than or equal to 5000 per hour then consideration of the membership value of that path is medium. If the number of vehicles in any path is less than 5000 per hour then we consider the membership value of that path is low.



# ANALYZATION IN FIVE ROAD JUNCTION TRAFFIC LIGHTS PROBLEM USING GRAPH

Membership values of the vertices

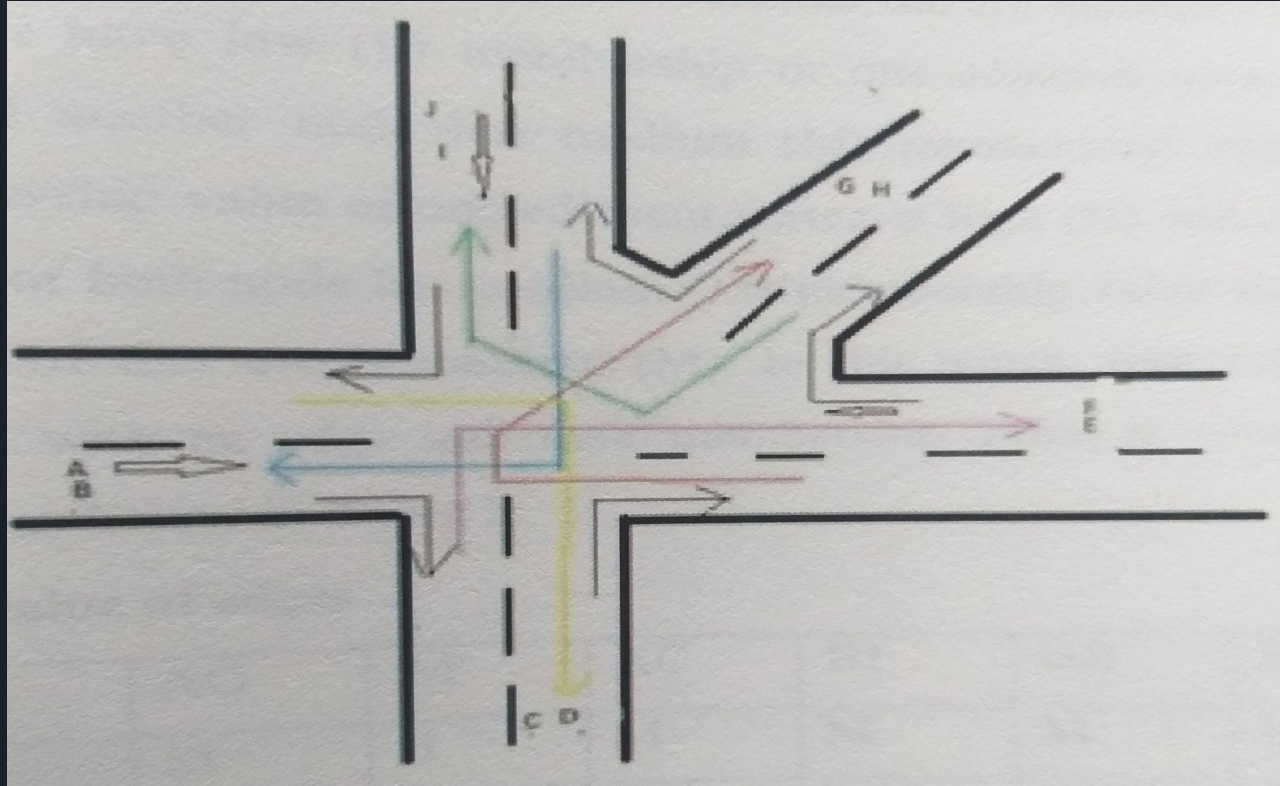
Vertex	A	B	C	D	E	F	G	H	I	J
$\Sigma$	M	H	M	L	M	H	M	L	M	L

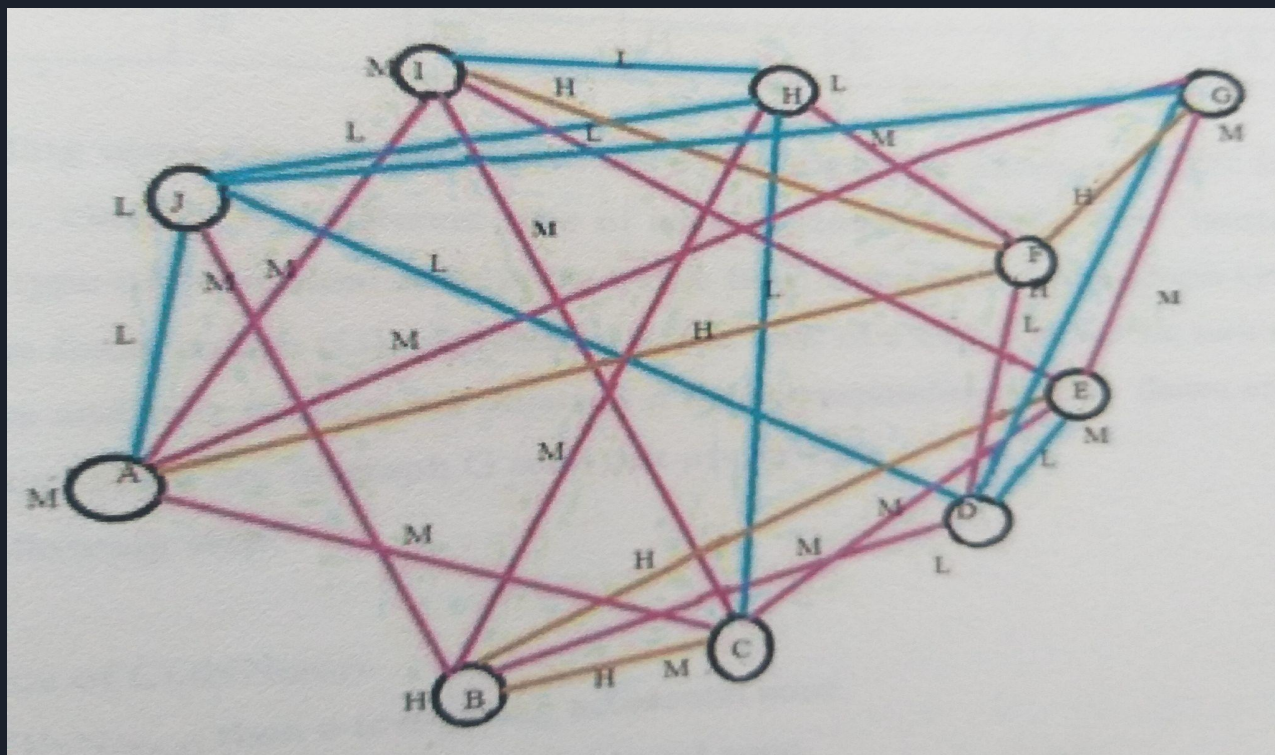


To develop a traffic pattern so that vehicles can pass through the intersection without interfering with other traffic flows.

In this problem, representation of each traffic flow using the vertices of the fuzzy graph and their membership value depends upon the the number of vehicle of that road. Two vertices are adjacent if the corresponding traffic flows cross each other.

For instance, direction C and H intersect, so vertices C and H are adjacent. If two vertices are adjacent then there is possibility of accident. The possibility of accident depends on the adjacent vertices membership value which represents number of vehicles on the road.







# CONCLUSION

In this project, representation of the traffic flows using a fuzzy graph whose vertices and edges both are fuzzy vertices and fuzzy arcs is given so there is vagueness in vertices and also in edges. Using this membership value of edges and vertices, is introduced method to classify the accidental zone of a traffic flows. By giving a speed limit of vehicle according to accidental zone.



THANK YOU