

Ahmedabad
University

CSE-523 Machine Learning

Weekly Report-7

Project Title: Use fuzzy logic to find the direction of motion of a vehicle.

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Summary:

After successfully implementing fuzzy logic for direction determination, we further refined the implementation to enhance accuracy. We developed algorithms to calculate angles between consecutive points in an object's trajectory and applied fuzzy rules to predict the direction based on these angles. Fine-tuning membership functions and addressing critical scenarios were key challenges encountered during the process. Visualizations were created to provide a comprehensive understanding of object movement patterns. The next steps involve continued refinement of fuzzy logic implementation to handle critical scenarios more robustly.

Activities:

Fuzzy Logic:

- Developed algorithms with accuracy to calculate angles between consecutive points in an object's trajectory.
- Implemented fuzzy rules to predict direction based on angle ranges.
- Fine-tuned membership functions to improve accuracy.
- Visualized results by plotting resultant vectors and fuzzy logic-based direction indicators on images.
- In terms of ML, we gave 15 instances as an input and expect that model will give us the next 5 states as an output and then compare it with ground truth.

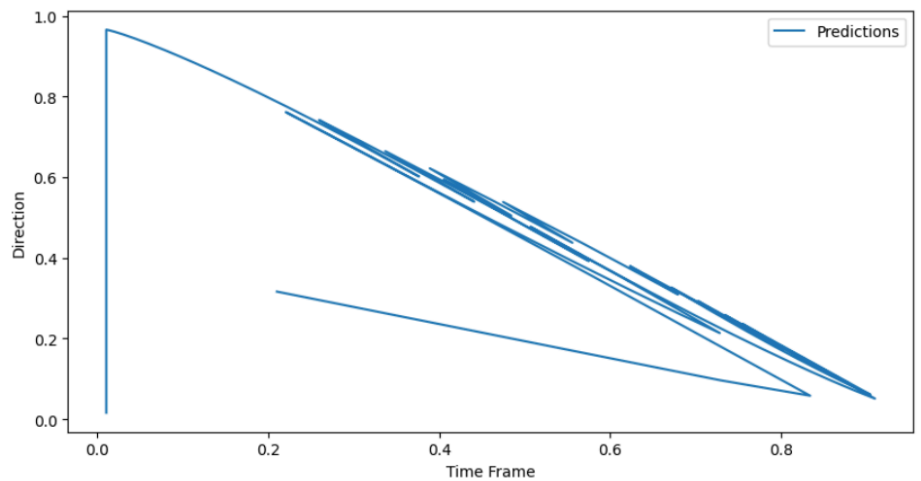
Images

	Frm	Track	xc	yc	w	h	Velocity(kmph)	Unnamed: 7	Unnamed: 8	Direction
41880	1990	165	1853	42	112	84	0.000000	NaN	NaN	S
41908	1991	165	1854	46	112	93	11.979533	NaN	NaN	S
41936	1992	165	1857	51	113	102	16.993516	NaN	NaN	SE

Output

	Frm	Direction
0	1990	S
1	1991	S
2	1992	SE
3	1993	SE
4	1994	SE

Plot



Challenges Faced:

While implementing fuzzy logic for direction determination, we encountered the following challenges:

- Fine-tuning Membership Functions: It was implemented however to get an appropriate output was necessary with proper accuracy and make our model more robust.
- Handling Critical Scenarios: We successfully implemented the fuzzy logic in the code. However, some of the critical scenarios required more robust handling like turning points as creating a bounding box was critical to get perfect accuracy.

Next Steps:

- Focus on further refining fuzzy logic implementation for improved accuracy.
- Ensure robustness in handling critical scenarios.
- Test implementation on new datasets to evaluate performance in diverse conditions.

Conclusion:

By the end of this week, now we are almost there where we can conclude that our project is done with only a few changes. It was a beautiful journey where we learnt about machine learning and implemented it for fuzzy logic.