TOWARDS UNSUPERVISED FILTERING OF MILLIMETER-WAVE RADAR RETURNS FOR AUTONOMOUS VEHICLE ROAD FOLLOWING

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INTRODUCTION

Path planning and localization in low light and inclement weather conditions is a critical problem facing autonomous vehicle systems. This work explores a **radar-based perception system for the detection of reflective roadside landmarks** to enable localization and path planning in poor visibility conditions.

CHALLENGE

The greatest challenge facing radar-based perception systems is the **sparsity and noise** of the radar data.

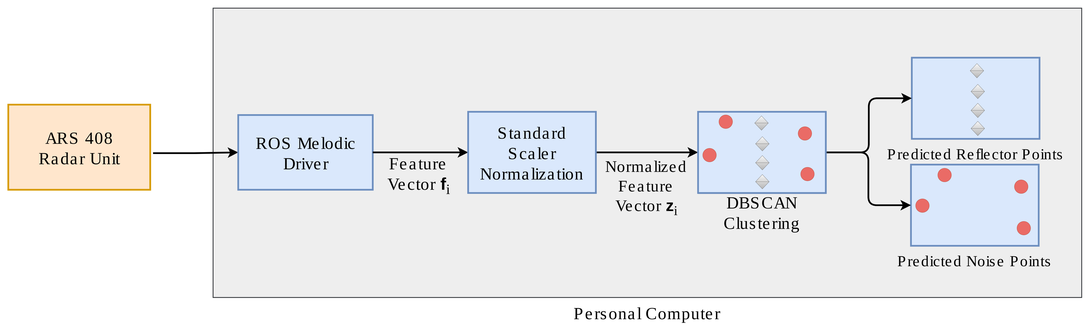
How can we detect reflective roadside landmarks using radar as the main exteroceptive sensor?

METHODOLOGY

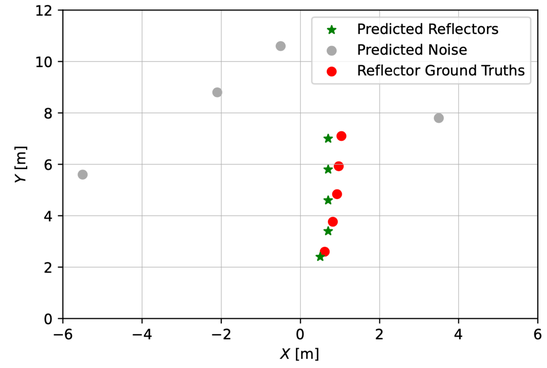
We use **DBSCAN clustering** to segment radar data into two classes: reflector points or non-reflector points,

The input feature vector $\mathbf{f_i}$ consists of 2D cartesian range values and radar cross-section values of inferred objects.

THE PIPELINE



EXAMPLE CLUSTERING PREDICTION



RESULTS

The proposed clustering system predicts whether each radar return corresponds to a reflector point or a non-reflector point with **84.13% accuracy** and **83.71% F1 score** on our collected radar dataset.

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CONCLUSION

The detection of physical infrastructure (i.e., passive retro-reflectors) with radar could be the key to localization challenges under extreme weather conditions. This work contributes to the development of radar processing techniques and also studied the effectiveness of unsupervised learning for segmenting radar data.

EXPERIMENTAL PLATFORMS