

(Doctorat : D₄)
RESUME DE THESE¹

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Titre de la thèse	Artificial Intelligence for Vehicle Environment Detection and Recognition
Discipline/ Spécialité	Sciences de l'ingénieur/ Mathématiques Appliquées et Informatique
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Résumé : (150 mots)

Traffic accidents globally claim countless lives each year, with pedestrians particularly vulnerable. Enhancing safety through advanced driver assistance systems and autonomous vehicles is critical to protect pedestrians, cyclists, and other road users. These technologies detect and interpret the surrounding environment to prevent collisions and minimize accidents. Understanding the environment is crucial for autonomous driving systems. This thesis focuses on predicting pedestrian trajectories, essential for ensuring pedestrian safety amid the complexities of pedestrian behavior. We introduce a novel approach: a multigraph spatio-temporal convolutional network based on a multi-relational pedestrian graph, enabling precise trajectory prediction by capturing intricate interactions. Another critical task is predicting pedestrian crossings, determining whether pedestrians will cross or wait a decision pivotal for road safety. Our approach involves extensive feature engineering and two prediction pipelines: traditional machine learning classifiers and graph neural networks, both demonstrating significant advancements. Furthermore, our study introduces a model for recognizing road traffic signals, particularly textual ones, using a lightweight model with attention mechanisms. This research marks a significant step forward by considering both symbolic and textual traffic signals comprehensively.

Mots clés : Trajectory Prediction, Pedestrian Crossing Intention Prediction, Traffic Sign Recognition(TSR), Graph Neural Network(GNN)

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