SUMO Traffic Simulator Interface for Scenic

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Abstract–**SCENIC is a scenario description language for autonomous systems with interfaces for simulators such as Grand Theft Auto V, and CARLA. SUMO traffic simulator is a powerful tool for performing AV simulations with realistic traffic and the opportunity for scene micromanagement through a python interface. Linking SUMO with Scenic, opens many possibilities for AV scenes generation for fast and lightweight SUMO simulations. This paper introduces the first interface between SUMO traffic simulator and Scenic.**

Index Terms–**Autonomous Vehicles, SUMO, Scenario Generation, SCENIC**

I. INTRODUCTION

This research introduces the first SUMO Traffic Simulator interface for Scenic, a critical component developed out of necessity for lightweight, modular, and scalable autonomous vehicle (AV) scenario generation. SUMO Traffic Simulator [1] is an open source simulator for microscopic traffic simulation, with efficient and realistic vehicle behaviour that is lightweight and scalable. The simple graphics of SUMO provide just enough information for debugging and presentation without sacrificing performance. Additionally,the Traffic Control Interface (TraCI) [2] for SUMO provides microscopic control with a Python interface. Scenic is a scenario description language for autonomous systems by Fremont et. al [3], which is implemented in Python and provides human-readable syntax for describing scenes.

II. METHODS

The components of the SUMO-Scenic interface are presented in Figure 1. The greyed components are the contributions of this interface. An AV scenario is selected from a database of modular and measurable scenarios [4], which is described in Scenic format as a scenario with parameter ranges. An extension of the Scenic Python module samples the parameter ranges and formats the data for TraCI, the Python interface for SUMO. Since the vehicles in SUMO exist on the edges of the graph that is the street network of the world, rather than an xyz position, the vehicle positions are described by their location on the street network edges. This feature is additional to the base Scenic functionality. Once the scene is generated, it may be run via TraCI as a SUMO simulation.
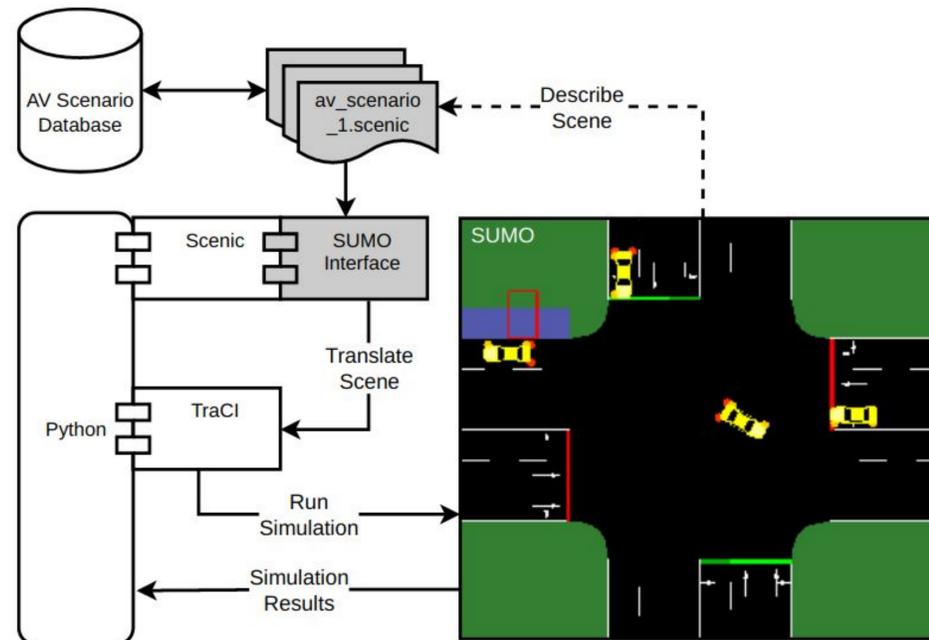

Fig. 1: Components of the SUMO-Scenic interface, from scenario to simulation.
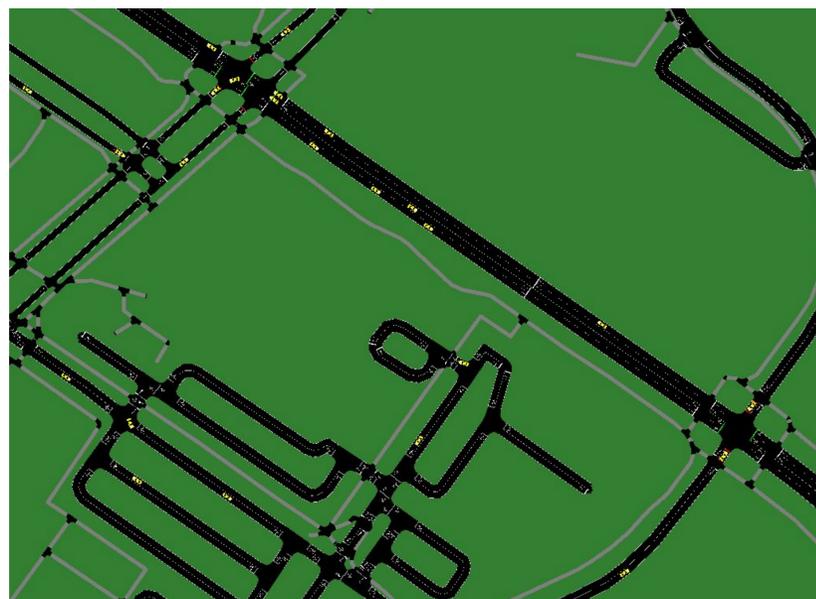

Fig. 2: A SUMO simulation of the Embry-Riddle campus street network with injected traffic.

III. RESULTS

The latest version of this interface is available online at: https://github.com/AkbasLab/scenicsumo. Several scenes and maps for SUMO scenarios are included in this Github repository:

- Six atomic scenarios from an AV scenario database [4] recreated in scenic.
- Various intersections.
- Parking e.x. a snapshot of this is shown in the SUMO box of Figure 1.
- Embry Riddle campus with traffic.

IV. CONCLUSION

The SUMO traffic simulator interface for Scenic is a critical and necessary component for lightweight and efficient software based AV simulation, which links two powerful tools. Moving forwards, this SUMO-Scenic interface is to be combined with state-of-the-art parameter selection methodologies to prioritize the generation of meaningful, modular, and measurable AV scenarios.

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