2022 Summer ELG 5142 Ubiquitous Sensing and Smart City Assignment 1

Professor: Dr. Burak Kantarci

Teaching Assistant: Zhiyan Chen, Email: zchen241@uottawa.ca

Reem Abdel-salam, Email: reem.abdelsalam13@gmail.com

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Assignment 1 is based on generating MCS tasks and user movement events. An example code is introduced in the first two weeks during in-class demonstrations. It is recommended to go through the examplecode and adjust it accordingly.

Assignment Background

Consider this: We have two independent sub-assignments, **1)** generating tasks, and **2)** obtaining user movement event. Both sub-assignments can use Python program language as demonstrated in Week-1 and Week-2 during in-class demonstration session. Specifically, according to task requirements (provided in Table 1), generate MCS **2,000** tasks. Uniform mobility algorithm is applied in CrowdSenSim to model user movement and generate user movements events (in crowdsensim2.py). Use stochastic algorithm and uniform algorithm to generate movements events separately, under **3** days, number of users = **15,000** (other configuration the same as default or configured as you needed)

Assignment Steps

1. **To simplify the assignment, please follow the following steps**:
    1. Setup test environment by installing python and related libraries, install virtual machine and load CrowdSenSim image.
    2. Configure Setup.txt file accordingly. The number of days and the number of users are configured in Setup.txt file.
    3. Refer to ZFMTasks.py to generate tasks and save in mytask.txt
    4. Refer to crowdsensim2.py to generate user movements event and save in to usermovements_0.txt, usermovements_1.txt, and usermovements_2.txt (representing three day simulation)
        - Generate user mobility under uniform algorithm
        - Generate user mobility under stochastic algorithm

Table 1 Task generation requirements

Task Feature	Requirement
Day	Distribution consistent in [1, 2, 3]
Hour	50%: 9:00 AM-11:00 AM 25%: 12:00 PM-5:00 PM 25%: 6:00 PM-8:00 AM
Duration (minutes)	50% in {20, 40, 60} 30% in {30, 50, 70} 20% in {10, 80, 100}
Task Value	Uniformly distributed in [1,10]

Required Sections in the assignment:

Points you need to include in your assignment report:

1. 40 points for generating tasks as required and saving tasks to mytask.txt
2. 60 points for generating user movement events using a stochastic algorithm (recommended: Dirichlet distribution for stochastic algorithm)

Tips for implementing the stochastic mobility model

1. Refer crowdsensim2_for_assignment_1_reference.py to add a parameter (stochastic_model_routes) to control if stochastic algorithm is selected
2. Line 640 to line 650 in crowdsensim2_for_assignment_1_reference.py shows two options for the mobility model (e.g., stochastic, or uniform-based longest path).
3. What you need is to select a stochastic path rather than the longest path
4. Adjustment of parameters (e.g., number of users = 15,000) is exactly the same as the uniform mobility model

Support Links:

1. https://crowdsensim.gforge.uni.lu
2. https://www.python.org/downloads/
3. https://en.wikipedia.org/wiki/Dirichlet_distribution
4. https://numpy.org/doc/stable/reference/random/generated/numpy.random.dirichlet.html