The UML for the Simulation of COVID-19

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Person

Attributes:
+ time: Float = 0
- last_step_change: Integer = -1
- velocity: ndarray = np.zeros(2)
+ point: ndarray
+ status: String = "S"
+ repulsion_points[0..10]: List
+ num_infected: Integer = 0
+ getting_infected_time: Float
+ infection_radius: Float = 0.5
+ probability_of_infection: Float = 0.5
+ incubation_period: Float = 1.04
+ infection_duration: Float = 4.0
- dl_bound: List = [0, 0]
- ur_bound: List = [10, 10]
- wander_step_size: Integer = 1
- wander_step_duration: Float = 1
- gravity_well: ndarray
- gravity_strength: Integer = 1
- socail_distance_factor: Float = 0.2
- percentage_of_social_distancing: Float = 0.7
- n_repulsion_points: Integer = 10
- wall_buffer: Integer = 1
- max_speed: Float = 1.0
- dt: Float = 0.01

Methods:
+ set_point():ndarray
- update_status(in status:String)
- update_position(in dt:Float) (operation in one box)
- update_infection_ring(in infection_radius:Float, in dt:Float)
+ update_time(in dt:Float)

SIRSimulation

Attributes:
+ n_cities: Integer = 6
- city_pop: Integer = 100
+ total_population: Integer
+ travel_rate: Float = 0.3
+ trigger_case_rate: Float = 0.05
- percentage_of_no_symptom: Float = 0.2
+ quarantine_mode: Boolean = False
- percentage_of_quarantine: Float = 0.7
- boxes[1..*]:List
- num_of_total_infected_case: Integer

Methods:
- add_box(): List, List
- add_people()
- update_statuses()
- get_status_count(): ndarray[1..4]

RunSimpleSimulation

Attributes:
- last_update_time: Float
- effect_reproduction_num: Float
- particles: Dictionary
- real_world_time_list: List
- percentage_S_list: List
- percentage_I_list: List
- percentage_R_list: List
- percentage_accum_case_list: List
- anim: matplotlib.animation.FuncAnimation
- plot_anim: matplotlib.animation.FuncAnimation

Methods:
- setup():
- run_until_zero_infection()
- update_R_label()
- show()

Matplotlib

matplotlib.animation.FuncAnimation