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Status Quo of Parking Location Choice in MATSim

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Why is parking important?

- Some studies identified 30% to 50% of traffic at central business district as parking search traffic
- Other studies report that parking policy can influence both transportation mode and traffic volumes
Problem definition

For a given activity destination, select from the set of public parkings in the neighbourhood so that the agent’s utility is maximized?

Parking characteristics
• price
• walking distance
• capacity
• parking access
• parking type
• (Etc.)
No changes to the MATSim simulation

Till now

With parking

Parkings modelled as short activities (e.g. one minute).
Parking location choice - implementation overview

- Gathering parking related statistics during simulation
- Add parking score to overall score

Allow agents to select new parking
Parking scoring function for experiments

- Components of the parking scoring function:
  - ParkingPriceScore = f(parkingDuration, parkingFacilityPriceRate, income)
  - ParkingAccessScore = f(access time, any other access disutility)
  - ParkingWalkingScore = f(distance, targetActivityDuration/Type)
  - ParkingCapacityViolationScore = f(how full is parking at arrival time) => this can be explicit or implicit

- Weightes chosen:
  - Parking gets a total score between 0 and 5
  - ParkingPriceScore, ParkingAccessScore and ParkingWalkingScore get same weight, whereas ParkingCapacityViolationScore gets 10 times higher weight
Parking location choice - replanning

Select, which parking to replan from all parkings done during the „previous“ day:

If (setOfParkingsWithCapacityViolation not empty) {
    Select randomly one parking from setOfParkingsWithCapacityViolation;
} else {
    Select randomly one parking from from all parkings.
}
Parking location choice – replanning (cont.)

Try to find parking with potentially higher score for the selected target activity (based parking statistics/estimates gathered during traffic simulation) in neighbourhood of target activity:

2

P

7

P

5

P

8

P

10

(the parking type choice also happens in this step)
Experiments and sensitivity analysis

• Using small test scenario
• Run with one million agents on the test network tried out
Scenario layout (chess board)
Does system relax? How many iterations?
Relaxation measure 1: capacity violation reduction
Relaxation measure 2: walking distance
Scenario layout – grouping of parkings
Parking price and income

- Two groups: one with very high and one with very low income (50% of people belong to each group)
- Parkings close to home and work are MUCH more expensive than the parkings further away.
Parking supply
Introducing parking access constraints
Temporal advantage (walking distance)
Parking type (in progress)

- Two groups of agents: driving electric vehicles (10% or conventional vehicles (90%)
- 2 types of parkings: only electric vehicle parkings (50%) and parkings for all vehicles (50%).
Future Work

- Cleaning code and incorporate into MATSim (core?)
- Agree on file structure of new data structures
- Improve replanning algorithm for better optimization

Long term:
- Add parking search into QueueSim (within day replanning)
Questions?