Transport Model for Commuter Trips

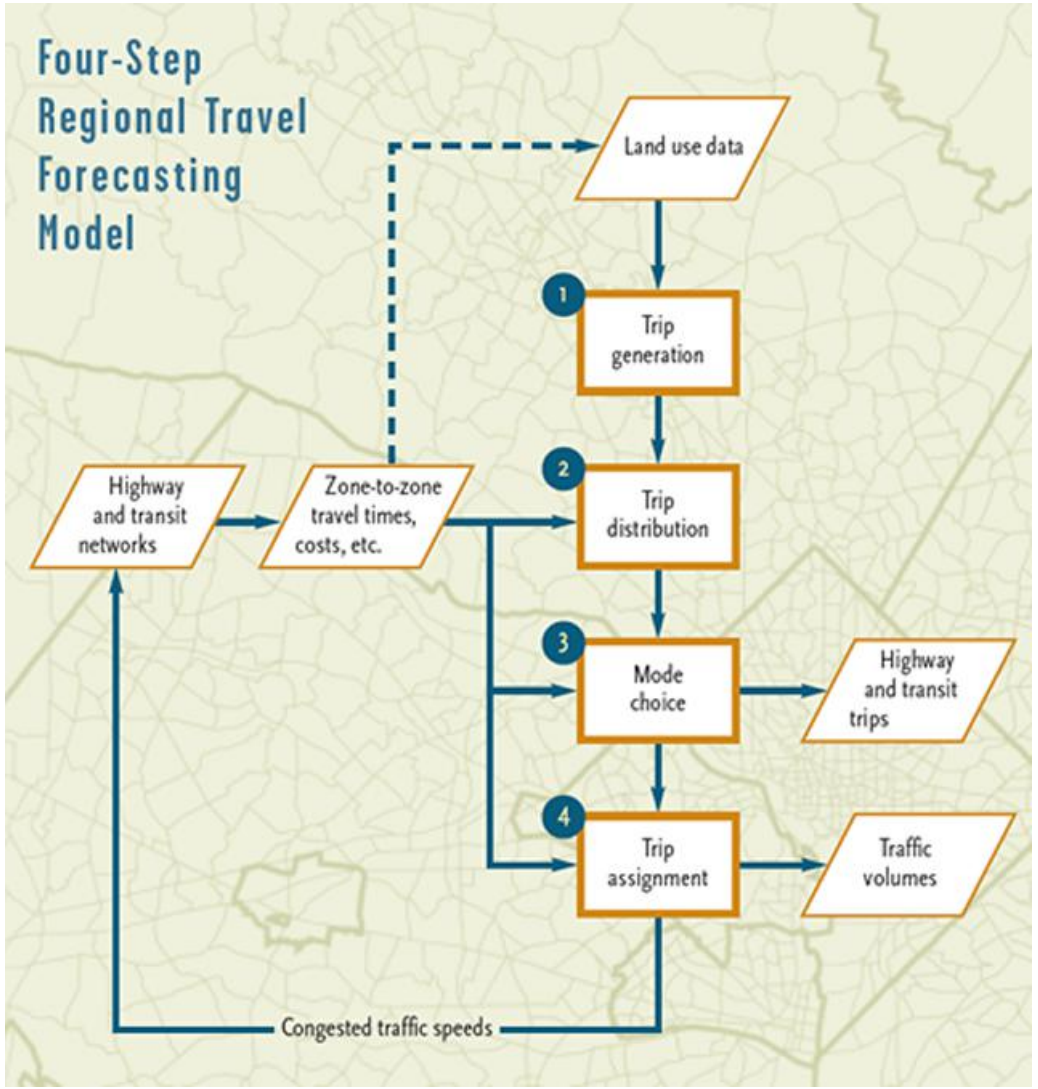
Mock-up for Bangalore as part of Fields of View task

Presentation for Academics

Sridhar Raman

Model Description

- Four-step Transport Model for Forecasting
  1. Trip Generation
  2. Trip Distribution
  3. Mode Choice
  4. Route Assignment
- Focusing on workers commuting from home to work location
- Model base scenario and compare with:
  - better public transport accessibility
  - traffic disincentivisation measures
- Aim is to understand how transport plans that can help:
  - increase active travel (public transport, walking, cycling, etc.)
  - reduce traffic congestion (lesser non-mass transport trips)



Scenario 1: Base Scenaro - Specification

- Looks at current challenges with different modes
- Ignores vehicle ownership
- Model result determines by “ease of mode”

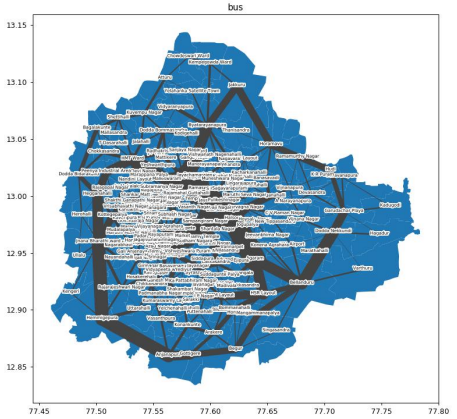
$$U_{walking} = e^{-0.05 * distance}$$

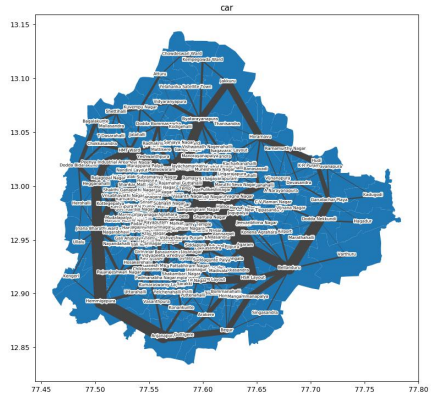
$$U_{bus} = e^{-0.03 * distance}$$

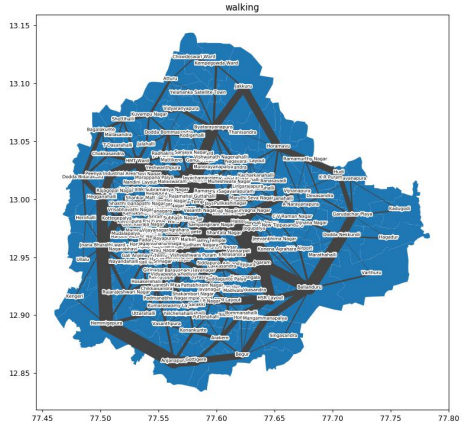
$$U_{car} = e^{-0.01 * distance}$$

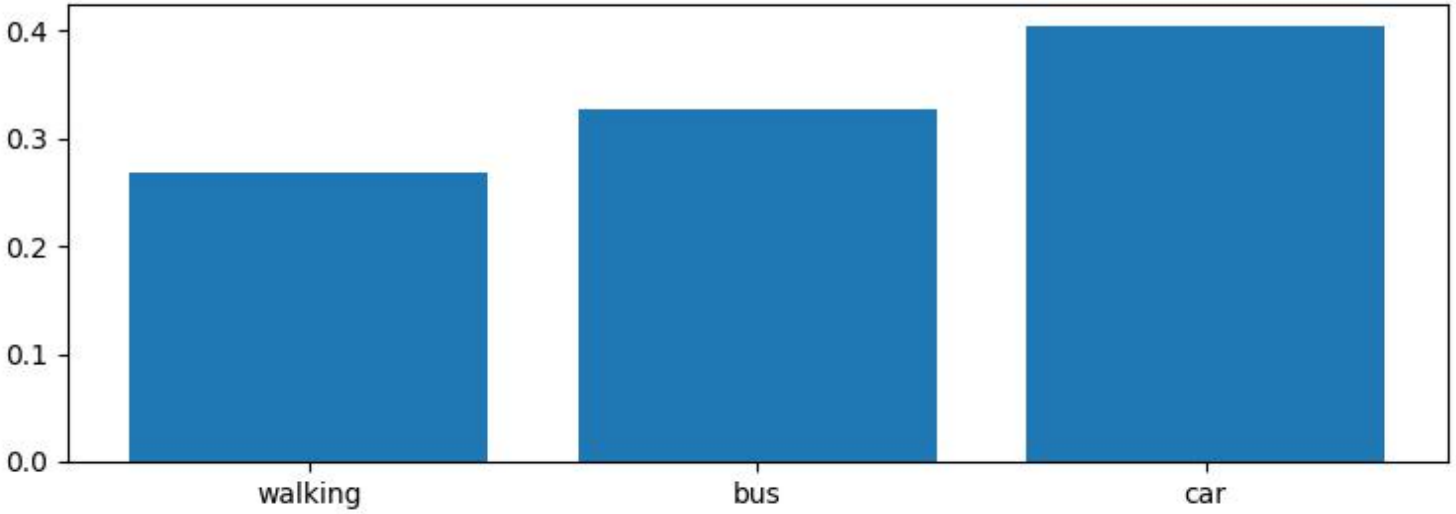
Scenario 1: Base Scenaro - Results

- Modal split (below) shows preference linked to ease
- Unsustainable, as resources required for satisfyind demand unavailable









Scenario 2: Flat Fare for Public Transport - Specification

- Currently, public transport fares in Bangalore are dynamic (i.e. dependent on distance)
- This scenario looks at a flat fare (e.g. Rs. 10)
- Trade-off between potential increase in ridership vs operation costs of transportation system

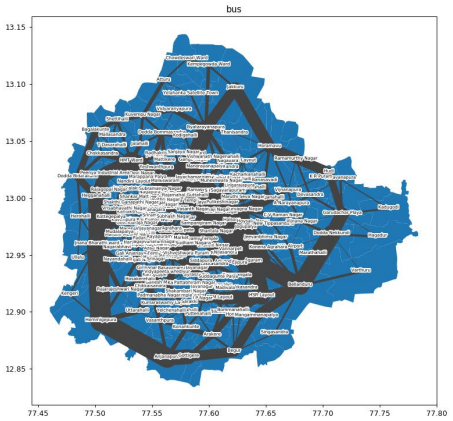
$$U_{walking} = e^{-0.05*distance}$$

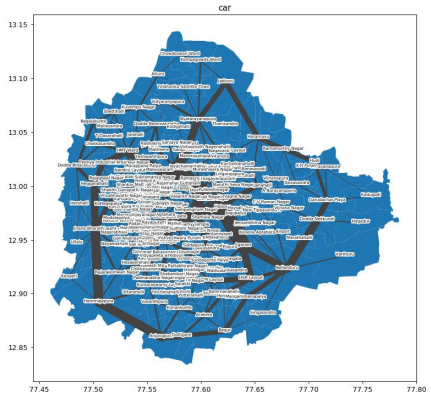
$$U_{bus} = e^{(-0.03*distance)+0.75}$$

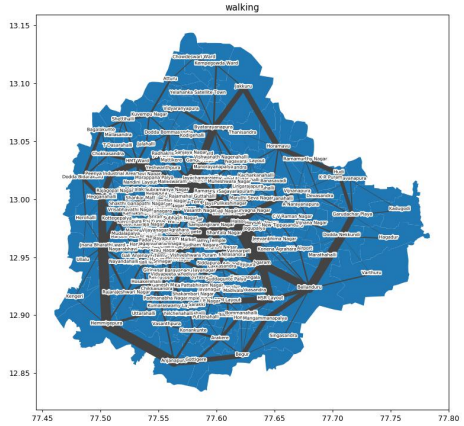
$$U_{car} = e^{-0.01*distance}$$

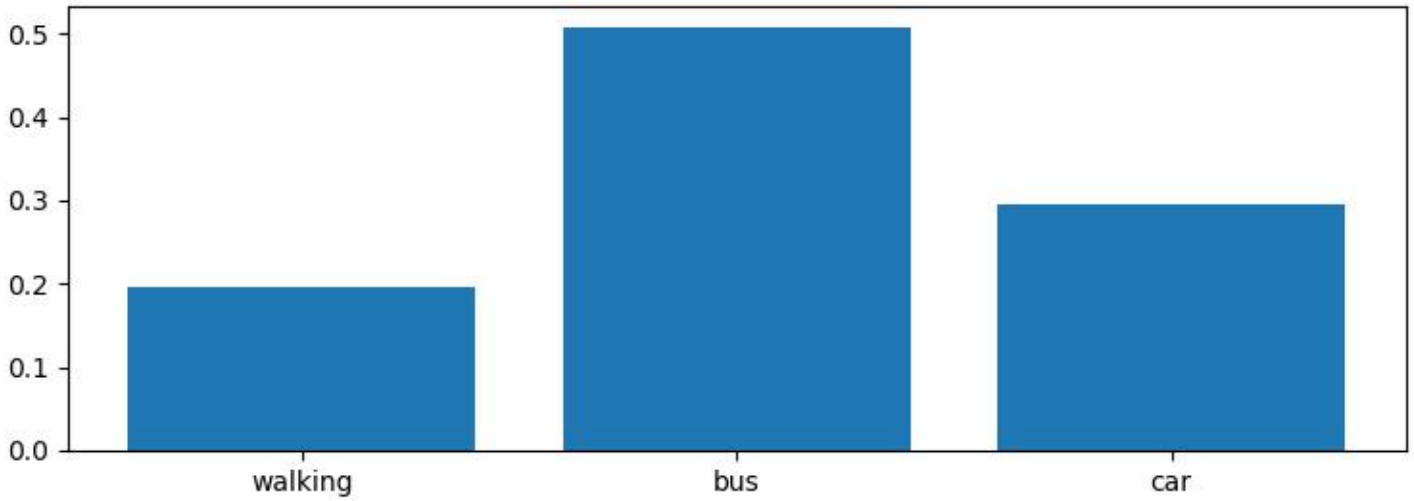
Scenario 2: Flat Fare for Public Transport - Results

- Modal split (below) shows huge uptake of buses
- Also, reduction in car trips adds an advantage to existing trade-offs
- Results seem to indicate reduction in walking as well, but this doesn't take into account the "walking" mode as part of "bus" modal choice









Scenario 3: Congestion Pricing - Description

- As seen in Base Scenario, cost of usage for “car” mode in the network is low
- This scenario looks at “congestion pricing”, i.e. additional charges on cars for entering certain zones/wards
- Flat congestion charge (not linked to distance)

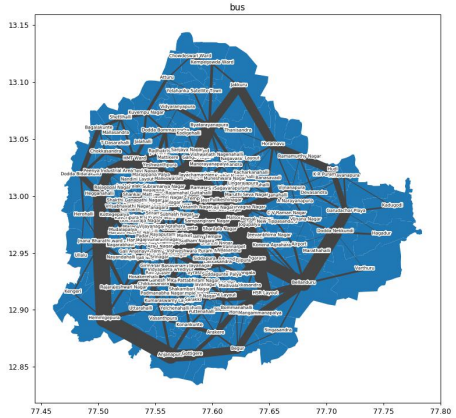
$$U_{walking} = e^{-0.05 * distance}$$

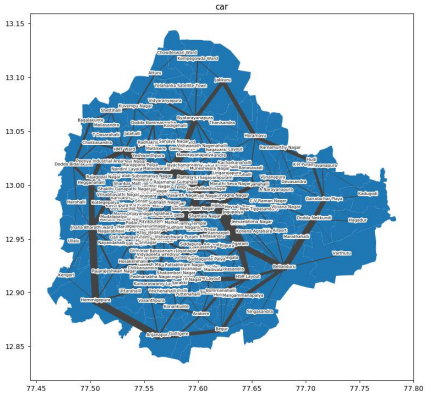
$$U_{bus} = e^{-0.03 * distance}$$

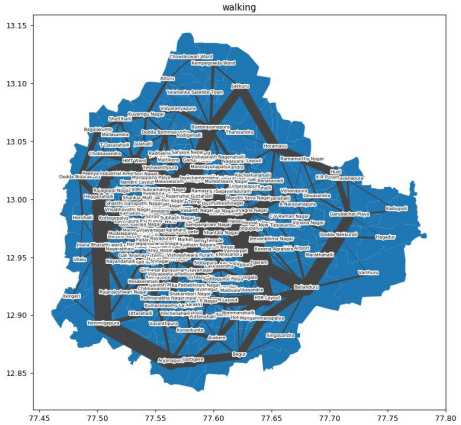
$$U_{car} = e^{(-0.01 * distance) - 0.75}$$

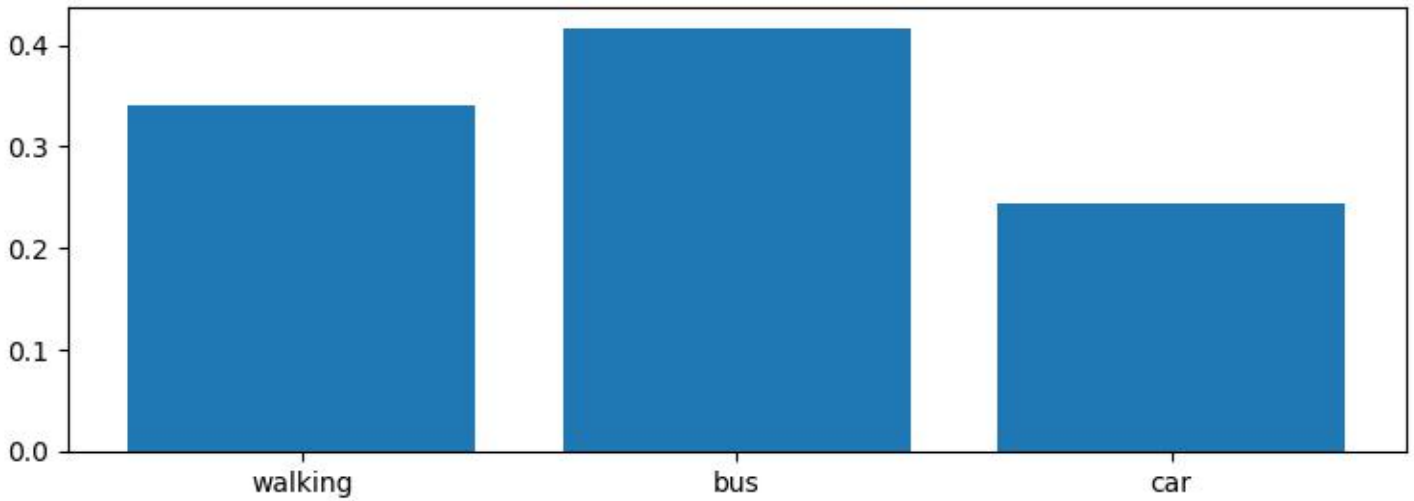
Scenario 3: Congestion Pricing - Results

- Modal split (below) shows increase in walking and bus trips
- Obvious reduction in car trips adds an advantage to existing trade-offs
- Reduction in car trips is more compared to Scenario 2, could be linked to difference between short and long distance trips

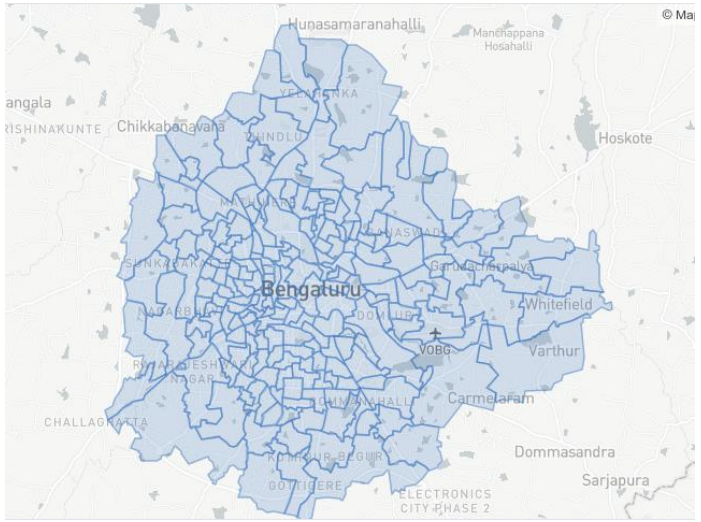








DATA: LINKS, ASSUMPTIONS



- SUPPLY
  - Bangalore ward data, sourced from shapefiles provided by BBMP
- DEMAND
  - Commuter Home Locations
    - available from Census data
    - validation done with average % of working population at district level
  - Commuter Work Locations
    - not easily available
    - assumed a normal distribution extrapolated from other countries' data

FUTURE ROADMAP

- Build an agent-based model to identify possible emergent phenomena
- Utility function based on distance, time and external costs (fares, etc.)
- Identify wards with high throughput of traffic and model “congestion pricing” on only those zones
- Assignment of routes for each mode based on road network
- Factor in vehicle ownership and other demographics details to better model trips and mode choice
- Link modes, trips with environmental factors to better understand air quality, noise, etc.

THANK YOU