By Cyclists, for Cyclists: Road Grade and Elevation Estimation from Crowd-sourced Fitness Application Data

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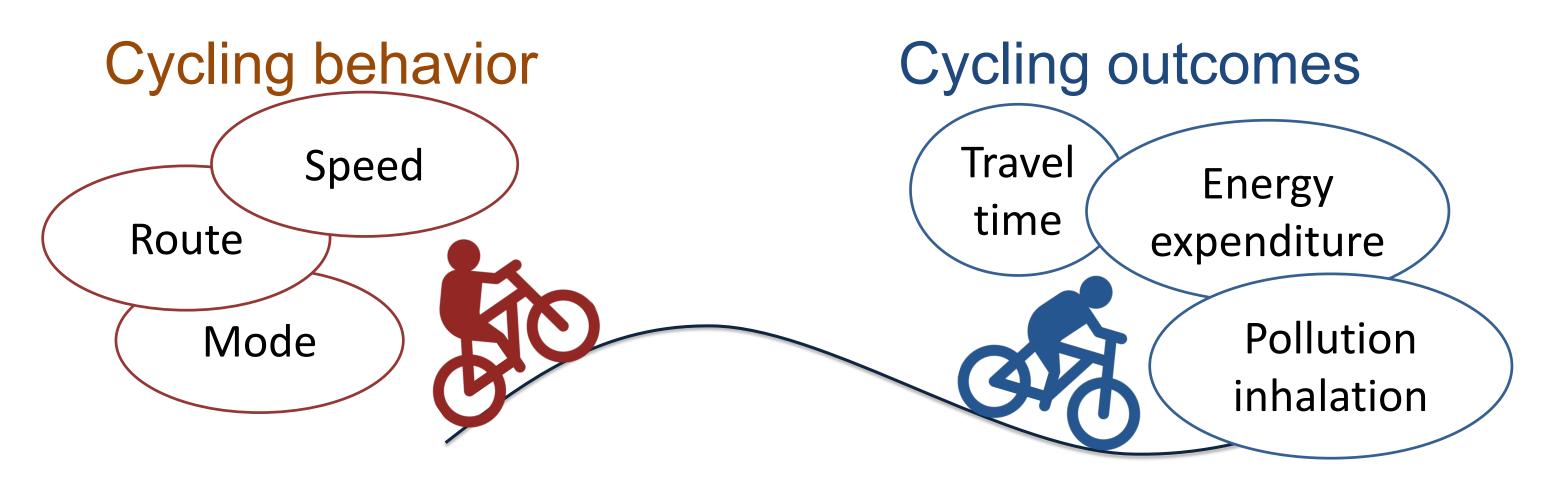
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research on active transportation

Inferred elevation & grade

Introduction

Road grade influences:



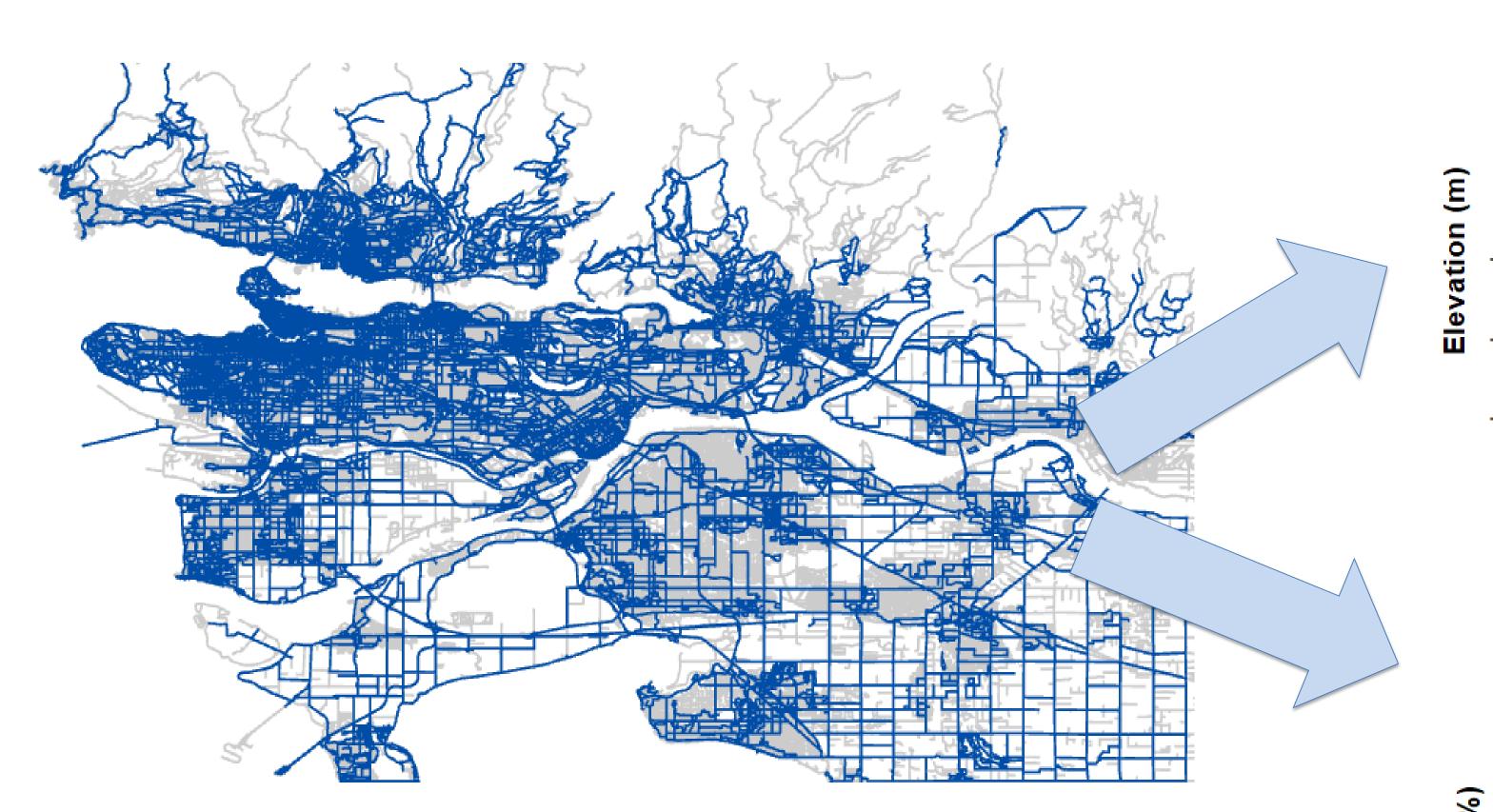
Objectives

1. External validation of method to estimate <u>elevation</u> from crowd-sourced GPS data (McKenzie & Janowicz, 2017)

Frechet distance

2. Develop method to estimate grade from crowd-sourced GPS data

Crowd-sourced GPS data



(composite of 4 measures)

Best method direct from GPS data, <u>not</u> from elevation profile



Method

Reference data Elevation Endomondo Survey (crowd-sourced GPS data) LiDAR Cycling app DEM 4. Cycling app Elevation efforts --> Composite Low-res data elevation profile Composite Composite grade profile 1 grade profile 2 High-res data Crowd-sourced data Inaccuracy measures Route mean squared error (RMSE of 6m) Earth mover's distance Hausdorff distance Inaccuracy

Findings

(RMSE of 1%)

Inaccuracy