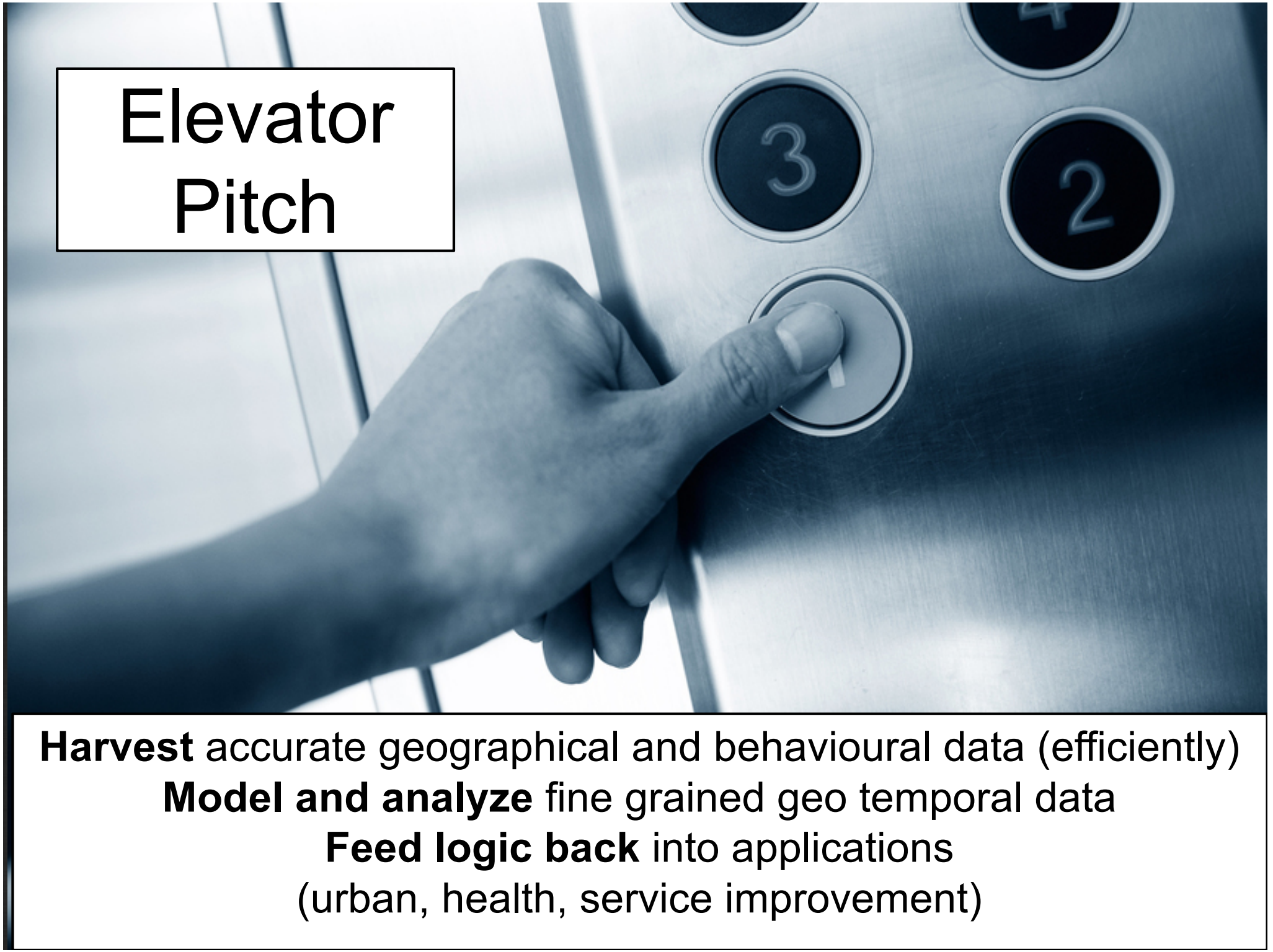
R249
Advanced Topics in Mobile and Sensor Systems and Data Modelling

Prof Cecilia Mascolo
Computer Laboratory, University of Cambridge


Elevator
Pitch
3
2
Harvest accurate geographical and behavioural data (efficiently)
Model and analyze fine grained geo temporal data
Feed logic back into applications
(urban, health, service improvement)

The course

- The course is about anything to do with mobile systems
  - Systems aspects including power
  - Sensing aspects
  - Mobility aspects
  - Applications
  - Mobile Data (cellular, services)

The Schedule

- 1 Nov (1h) Introduction (TODAY!)
- 8 Nov Mobile Operating Systems, Resource and Energy
- 15 Nov Mobile Sensing, Behaviour Modelling and Machine Learning on Mobiles
- 22 Nov Mobile Health
- 29 Nov Drones and Autonomous Control
- 22 Jan Cellular Detail Record Analytics
- 29 Jan Mobility Modelling, Human Sensing and Crowdsourcing
- 5 Feb (3h) Geo-Social Media Sensing and Urban Data Analytics

Assessment

- 70%: Aggregate mark over 5-6 reviews
- 30%: Presentations and participation in the discussion.
- **A class list of attendance will be kept and apologies for absence should be sent to the lecturer prior the lecture.**

Written Reviews

- Each week a student is not presenting
- Student picks a paper (their choice!) among the ones listed to be presented for the following week.
- Write no more than 1000 words (recommendation would be for a 750 words report).
- Form Online
- Random selection of student presenters
- Students presenting will submit slides instead of a report

Form

- Paper Report Summary of the paper (100 words)
- Discussion on novelty of the paper as stated (50 words)
- Positives of this Paper (200 words)
- Negatives of this Paper (200 words)
- Ideas for Future Work, Critical discussion of potential impact and context setting (200 words)

Report and Slides Deadlines

- **Michaelmas Term Deadlines:**
  - Assignment 1 due Tuesday 7 November, noon
  - Assignment 2 due Tuesday 14 November, noon
  - Assignment 3 due Tuesday 21 November, noon
  - Assignment 4 due Tuesday 28 November, noon
- **Lent Term Deadlines**:
  - Assignment 5 due Friday 19 January, noon
  - Assignment 6 due Friday 26 January, noon
  - Assignment 7 due Friday 02 February, noon

How to Read a Paper

- Is this an important problem?
- Does it have applications and does it matter if it does not?
- Is it novel?
- What are the good bits of this work or line of work?
- What is not said in the paper and should?
- What are the negatives of this work
- Where can this work go?
- Can this work be applied to other areas?

- Consider the paper age
- Consider the paper implications

How to Write a Report

- Write concisely and precisely
- Answer the headings
- Use scientific arguments

Presentation

- Presentations are 30% of total mark
- Each student will present 2 times
- No report when presenting (just submission of slides with same deadline)
- Students assigned randomly each week
- 30% mark composed of
  - 20% slides and presentation
  - 10% of discussion and participation through the course

What do I put in the slides?

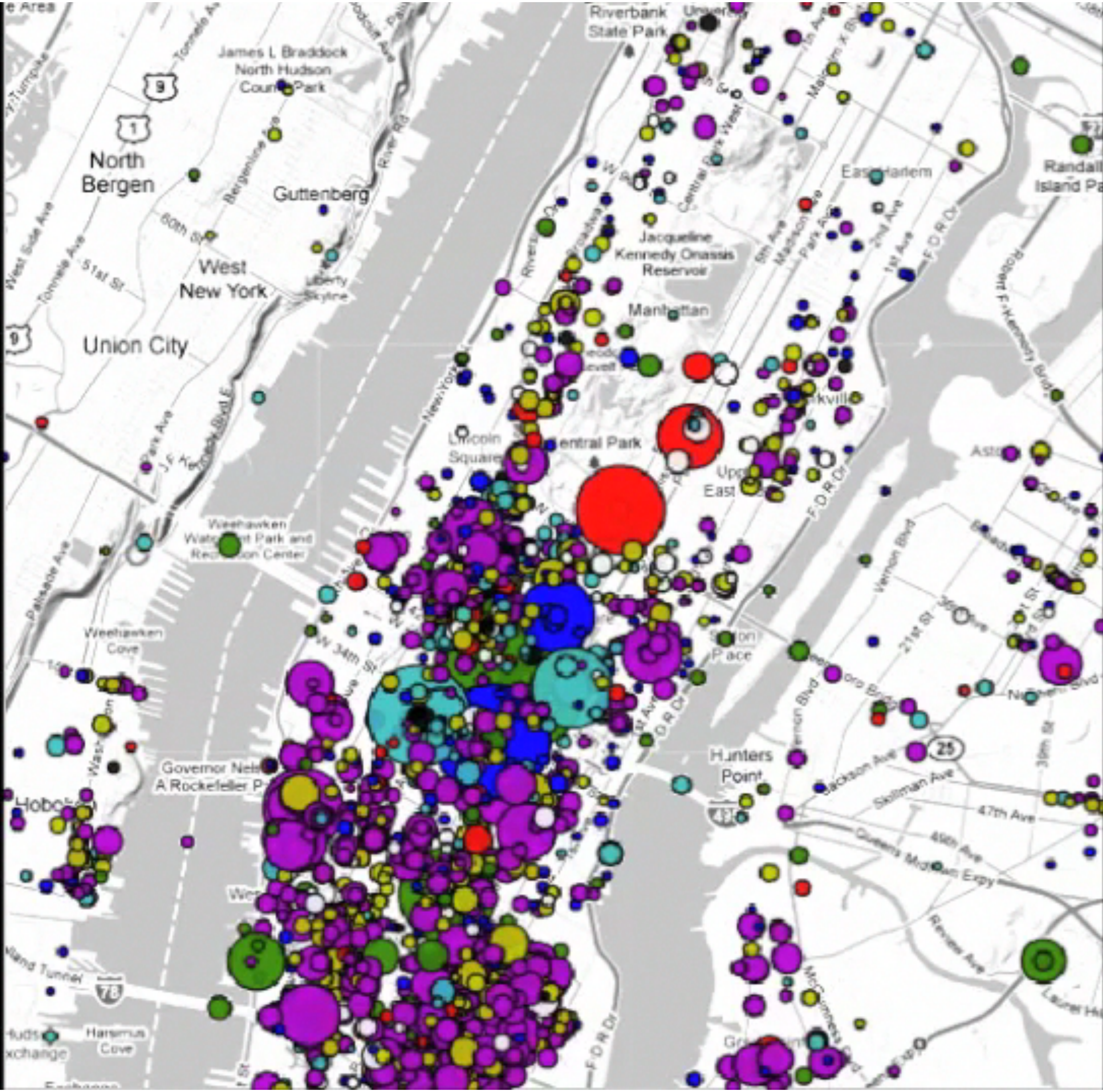
- The slides should
  - Introduce the problem the paper tackles
  - Describe the motivation of the work as in the paper and perhaps beyond
  - Describe pros and cons of the work
  - Illustrate and discuss future directions

The Papers!

- http://www.cl.cam.ac.uk/teaching/1718/R249/materials.hml
- http://www.cl.cam.ac.uk/teaching/1718/R249/paper-assignment.txt

About the group's research…

FOURSQUARE CHECK-INS SHOW THE PULSE OF **TOKYO**

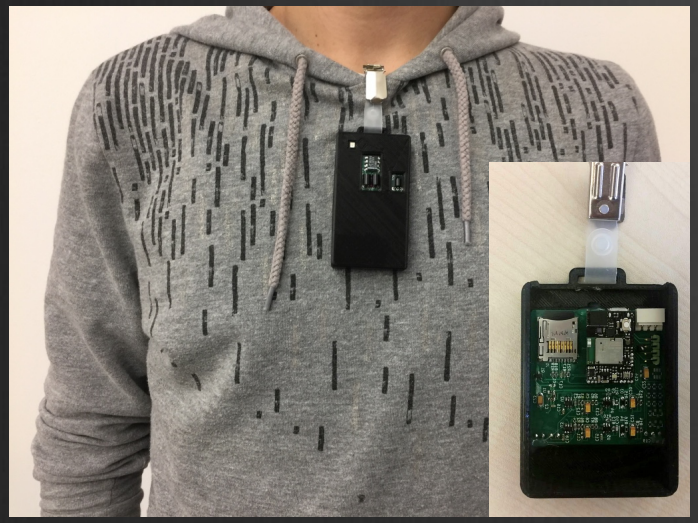


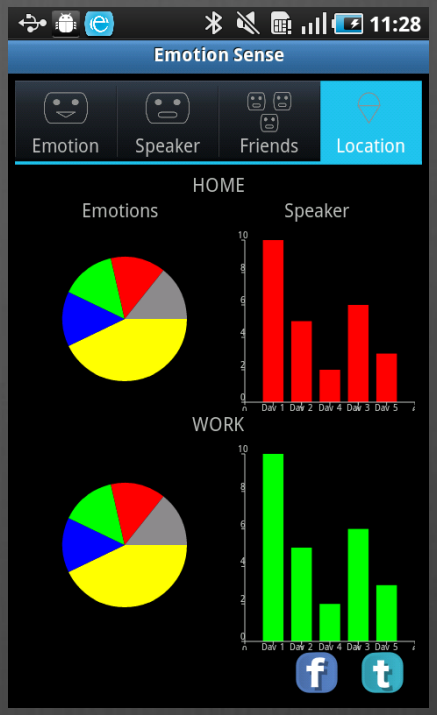
Riverbank State Park
James L Braddock North Hudson County Park
North Bergen
Guttenberg
West New York
Union City
Jacqueline Kennedy Onassis Reservoir
Manhattan
East Harlem
Randall Island Pa
Central Park
Lincoln Square
Upper East
Weehawken Waterfront Park and Recreation Center
Weehawken Cove
W 34th St
Governor Nelson A Rockefeller P
Hoboken
Hunters Point
Skillman Ave
47th Ave
Jackson Ave
Queens Midtown Expy
Harsimus Cove
F D R Dr
Robert F Kennedy Brdg
Vernon Blvd

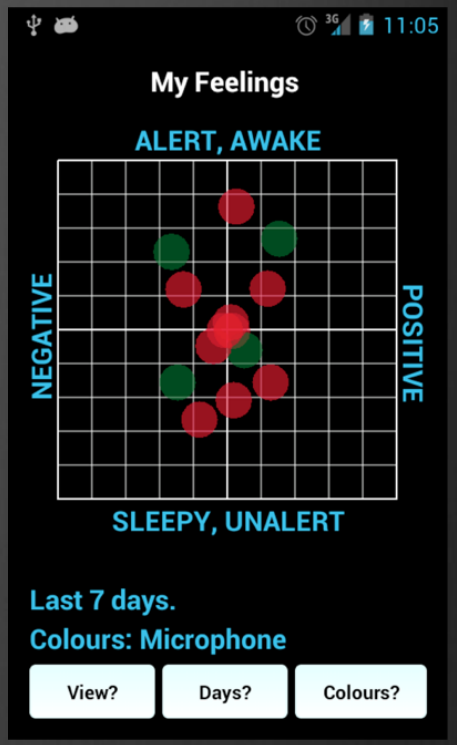
Our Stance at Urban Data Science

- Can analysis of mobility data help understand trends and urban space use?
  - Understand urban mobility, urban growth
- Can we predict and help development of urban space?
  - Help new venue placement to succeed
- Can we relate policies for regeneration with factual changes in the mobility data (human behaviour changes)?
  - cultural regeneration, neighbourhood gentrification and IMD
- Can we provide services to users to improve their urban experience?
  - Recommendations
  - Taxi brokerage tools


18
University of Cambridge
Alessandro Montanari
am2266@cam.ac.uk




11:28
Emotion Sense
Emotion
Speaker
Friends
Location
HOME
Emotions
Speaker
WORK

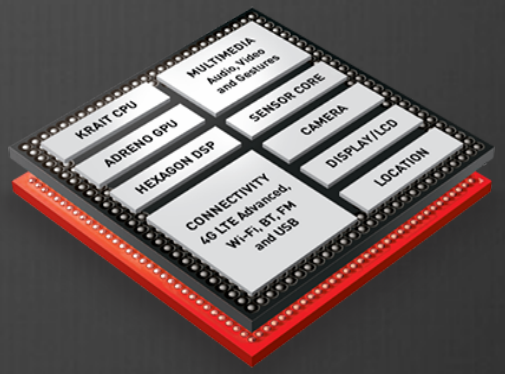

11:05
My Feelings
ALERT, AWAKE
NEGATIVE
POSITIVE
SLEEPY, UNALERT
Last 7 days.
Colours: Microphone
View?
Days?
Colours?


10:29
do you want to quit smoking?
begin

Sensing and Inference Efficiency for Continuous Sensing

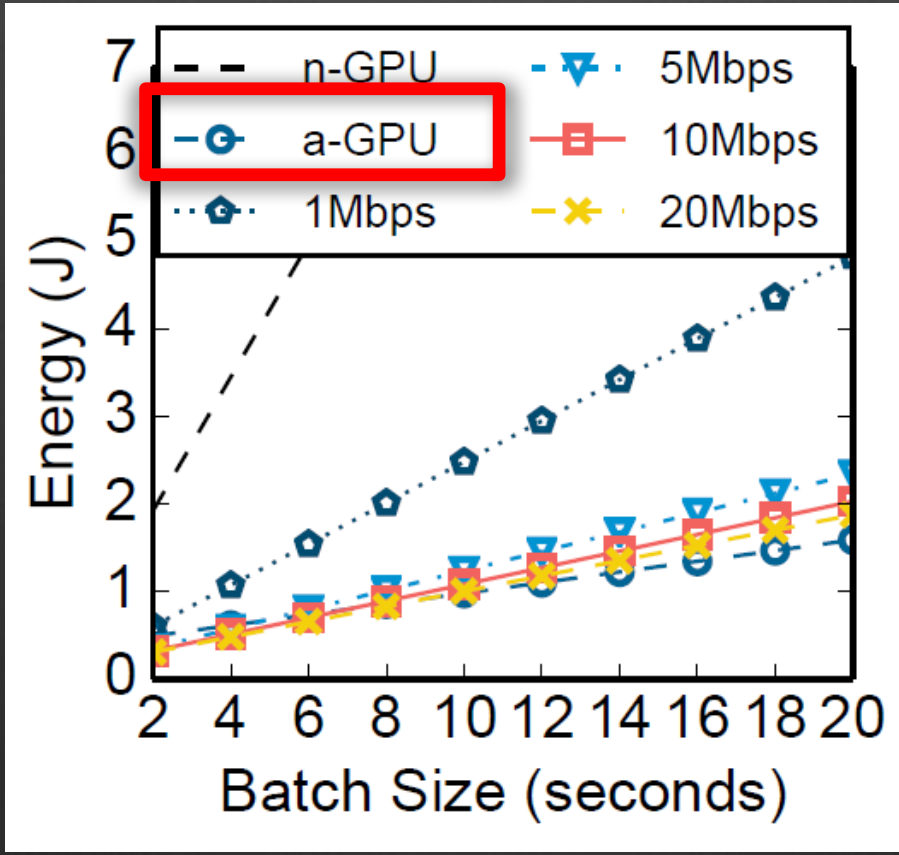
Snapdragon 800 MDP/S

Qualcomm Hexagon DSP



Optimized GPU is Efficient

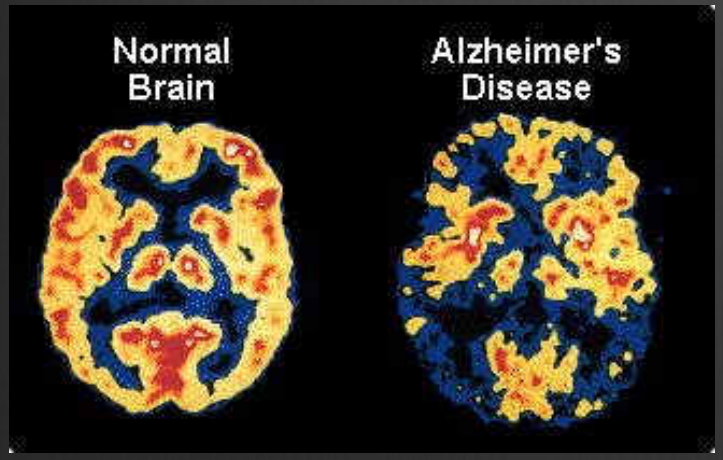
Optimized GPU with batching outperforms cloud energy-wise



What's next…


Privacy


AVOID BIAS
NEXT EXIT


Normal Brain
Alzheimer's Disease


S
M
T
W
T
S

Cecilia Mascolo
FN08
Computer Laboratory, University of Cambridge
cecilia.mascolo@cl.cam.ac.uk
www.cl.cam.ac.uk/users/cm542