Questions on Technological Progress
(Group C)

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Miki Komatsu, Tanuj Aasawat,Tanu Sharma

Background of Team Members

- Osamu Ishimura - PhD student @ The University of Tokyo, Japan
  - Focus: Domain Specific Language Platform for HPC System
- Yosuke Ueno - Master's Student @ The University of Tokyo, Japan
  - Focus: Neural network model selection method for efficient transfer learning
- Swapnil Gandhi - Master's Student @ IISc Bangalore, India
  - Focus: Distributed Graph Processing using cloud computing
- Miki Komatsu - Master's Student @ Kobe University
  - Focus: City-scale modeling of multiple infrastructures after natural disasters
- Tanuj Aasawat - RIKEN AIP
  - Focus: HPC and Large-scale Graph Processing
- Tanu Sharma - PhD Scholar @ Department of Chemistry, IIT Bombay, India.
  - Focus - Modelling of Single Molecular Magnets using HPC.
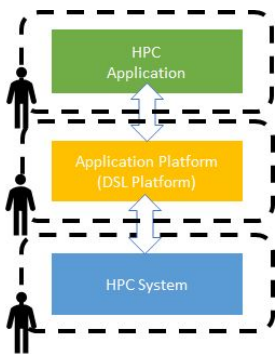
How we use HPC in our studies? (1/2)
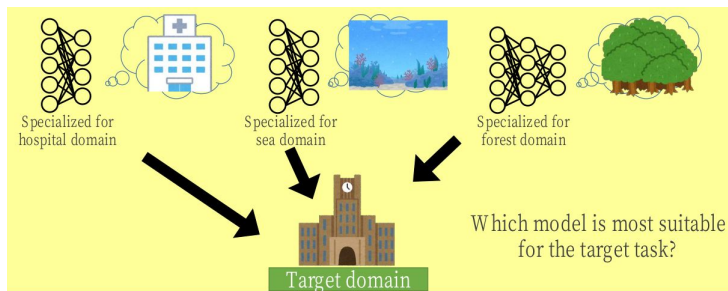
- Osamu Ishimura

  Not

  "Use HPC"

  But

  "Research HPC"

No More Ninja !

- Yosuke Ueno

Theme: Neural network model selection method for efficient transfer learning

Using HPC for training many DNN models

Specialized for hospital domain

Specialized for sea domain

Specialized for forest domain

Which model is most suitable for the target task?
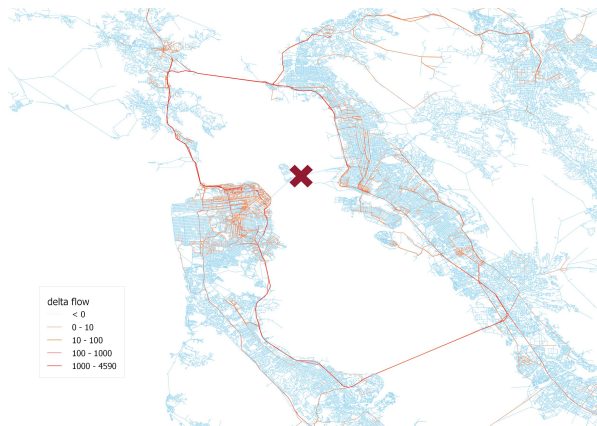
Target domain

- Swapnil Gandhi
- Graphs have wide applicability across many fields
- Temporal Graph Algorithms at scale
- Improved Programmer Productivity
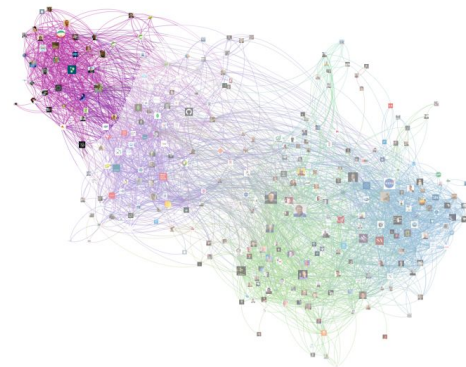
How we use HPC in our studies? (2/2)
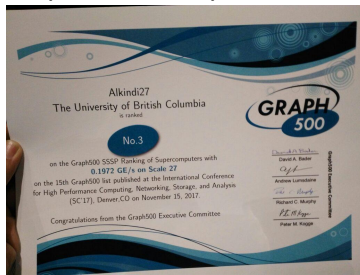
- Miki Komatsu

Simulating complex traffic dynamics
using shortest path algorithm
on graph network

- Tanuj Aasawat

Framework for processing
graphs with >100 Billion
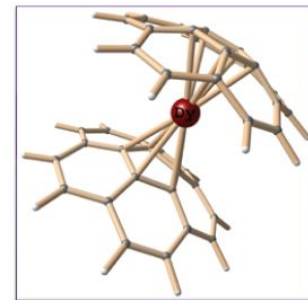edges on a NUMA machine

Highlights:
- **Scalable**: 3.7x on a
  4-Socket machine
- **High Performant**: 2.25x
  to 13.9x faster than
  state-of-the-art
- **Graph500**: World Rank
  2nd (ISC, 2018) and 3rd
  (SC, 2017)

- Tanu Sharma

Modelling and
investigation of SIngle
Molecular Magnets
(SMM's).
Use of DFT and ab initio
methods for
computations.

Questions we should ask ourselves for technology usage:

- How much we can trust technology?
  - Misprediction of disease by Google's Flu
  - Explainability in AI predictions
 - False images generated by AI

Questions we should ask ourselves for technology usage:

- To what level should countries collaborate when building a new machine/supercomputer?
  - Merits if they don't collaborate
    - healthy competition to develop state-of-the-art supercomputers
  - Demerits if they collaborate
    - Design exchange - often a secret
    - Data-ownership concerns
    - Homomorphic Computing to alleviate data ownership concerns

Questions we should ask ourselves for technology usage:

- How can we validate the results of big-scale simulation?
  - Powerful data to validate it being occupied by giant companies
  - If the data should be opened to public or not
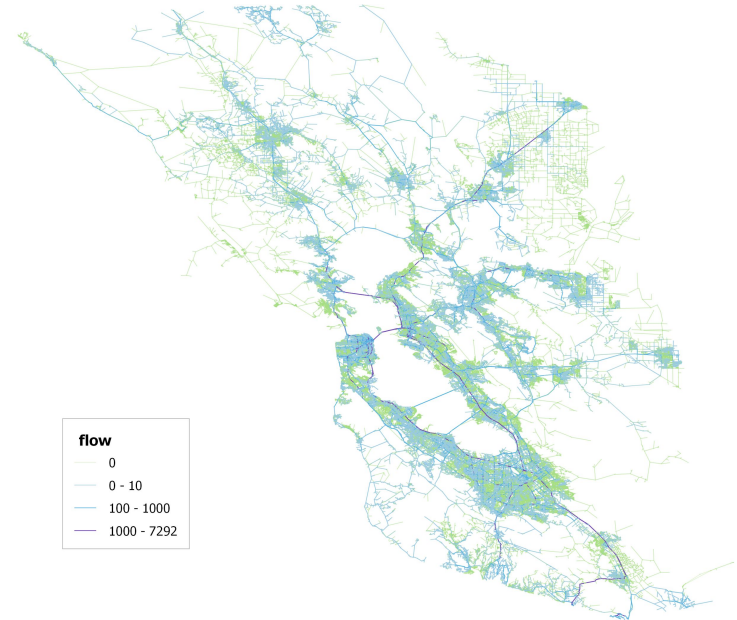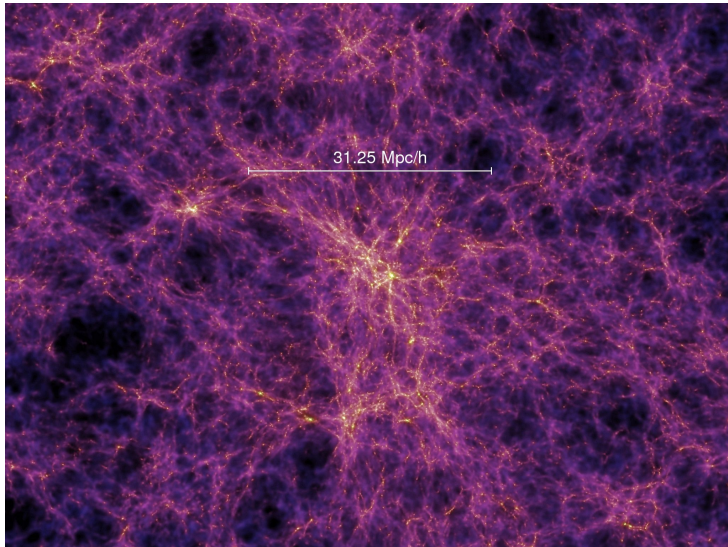
Questions we should ask ourselves for technology usage:

- Is it really worth to use our resources and manpower for development of Technology?

  No, because It may happen that the money earned by a huge number of people which will be spent on development of technology may prove to be useful to a very small group of people.
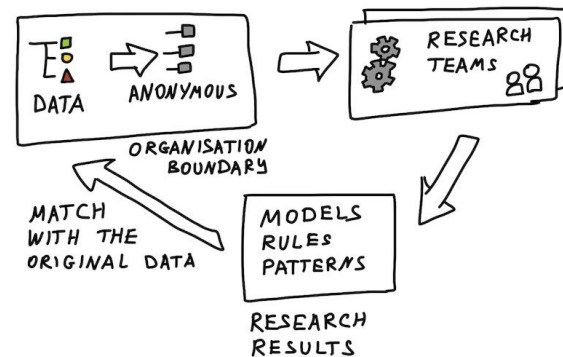
  In the race of developing the technology, some useful things may left behind.

  Yes, Because …...

Questions we should ask ourselves for technology usage:

Is Sharing really caring ?

- Should datasets also be published besides results ?
  - Publishing datasets makes research more re-traceable and useful beyond original purpose of collection
  - Better archival, attribution and discovery
  - But may lead to privacy concerns

- Possible ways forward:
  - Persistent Identifiers for datasets
    - Enables data rights and acknowledgement attribution
  - Dataset anonymization and obfuscation
  - Data Embargo…

Thanks for having us @ RIKEN-CCS