BIG DATA กับการจัดการองค์กรยุคดิจิทัล

สัมมนาสถาปนาสำนักบริการคอมพิวเตอร์ ครบรอบ 38 ปี
สำนักบริการคอมพิวเตอร์ มหาวิทยาลัยเกษตรศาสตร์

ดร.พูมใจ นาคสกุล

ภาควิชาปัญญาดิจิทัลเชิงประยุกต์ (Applied Digital Intelligence)

สถาบันนวัตกรรมบูรณาการแห่งจุฬาลงกรณ์มหาวิทยาลัย (School of Integrated Innovation)

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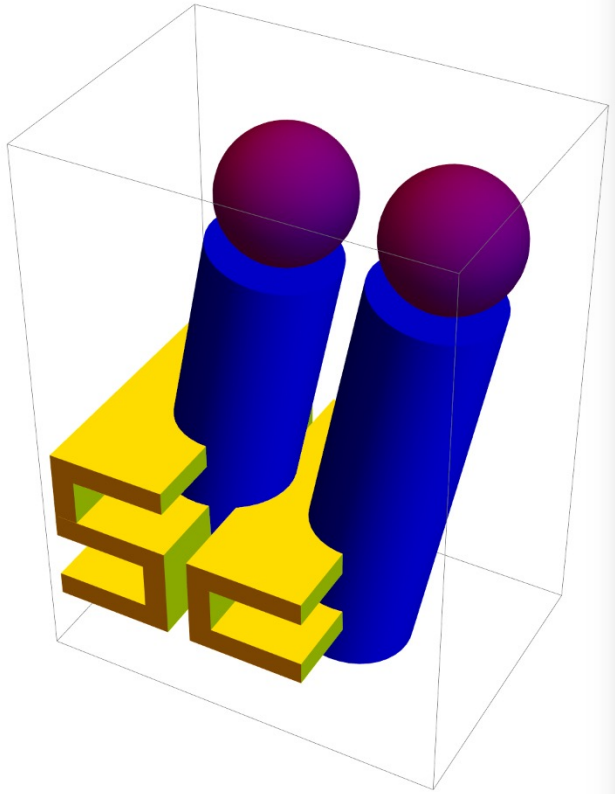
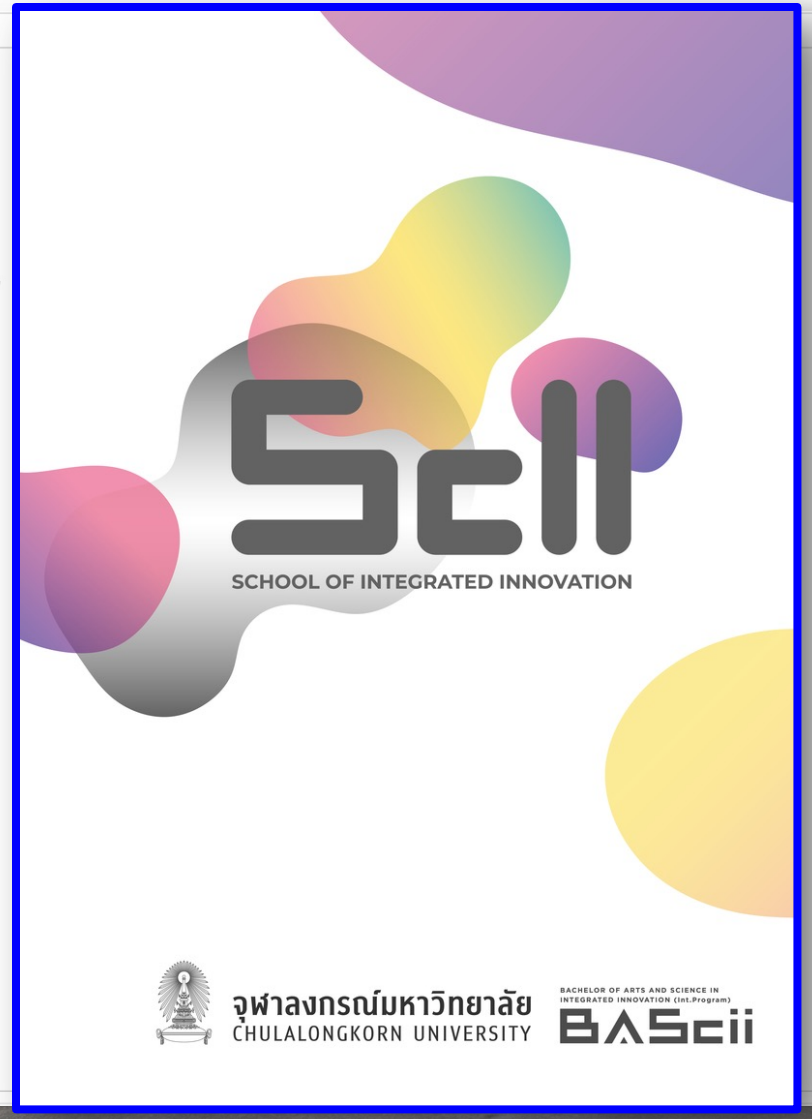
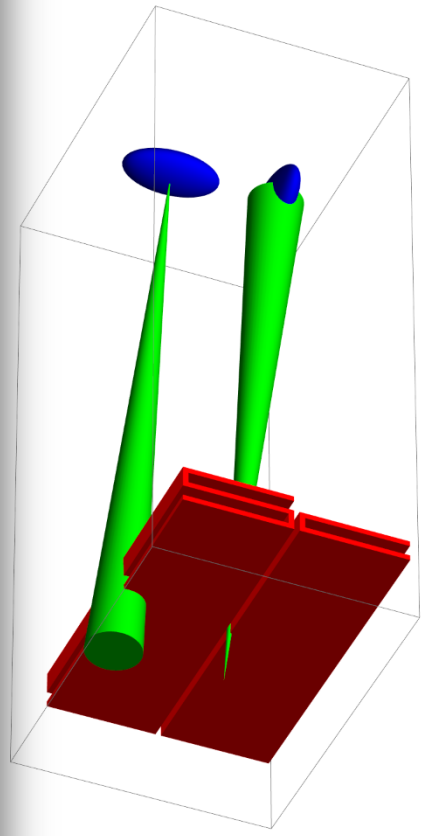
BIG DATA กับการจัดการองค์กรยุคดิจิทัล

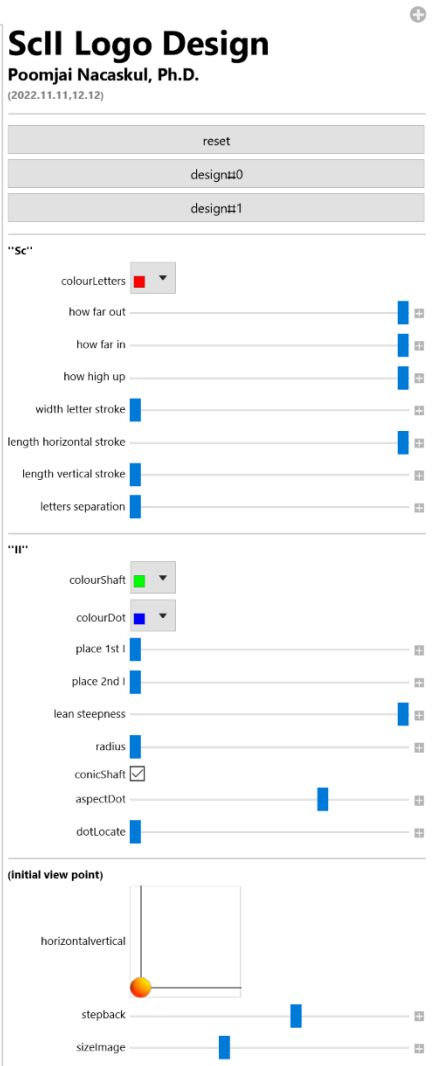
- I. INTRO – ScII, BAScii, ADI (and Poomjai)
- II. BIG DATA – the story so far (hype vs. reality)
- III. BIG DATA – catalyst for/driver of AI/ML/QM/DA
- IV. (การจัดการ)องค์กรยุคดิจิทัล – *why/what/how* BIG DATA

I. INTRO – ScII, BAScii, ADI (and Poomjai)









I. INTRO – ScII, BAScii, ADI (and Poomjai)

- สถาบันนวัตกรรมบูรณาการแห่งจุฬาลงกรณ์มหาวิทยาลัย

  ScII – SCHOOL OF INTEGRATED INNOVATION, CHULALONGKORN UNIVERSITY

  - หลักสูตรศิลปศาสตรและวิทยาศาสตรบัณฑิต สาขาวิชานวัตกรรมบูรณาการ

    BAScii – BACHELOR OF ART AND SCIENCE IN INTEGRATED INNOVATION

    - ภาควิชาปัญญาดิจิทัลเชิงประยุกต์

      ADI – APPLIED DIGITAL INTELLIGENCE

      - ดร.พูมใจ นาคสกุล

        Poomjai Nacaskul, Ph.D.

How can "Intelligence", as a generalised concept, be scientifically engineered essentially onto non-human-machine-based systems?

3 Meanings of Non-Human Intelligence

- "Human-Like/Understanding Humans" → Artificial Intelligence
- "Covert/Clandestine Information" → Military/Business Intelligence
- "Clever/Optimal Solution" → Computational(Artificial) Intelligence

3 Areas of Computational Intelligence

- "Emulate (Biological) Brain Functions" → Artificial Neural Networks
- "Nature-Inspired Solution Algorithms" → Evolutionary Optimisation
- "Interoperate w/ Humans/Society" → Cybernetics & Fuzzy Systems

If an intelligent person is a learned individual, it stands to reason that "intelligent machines" can be "programmed to learn algorithmically"

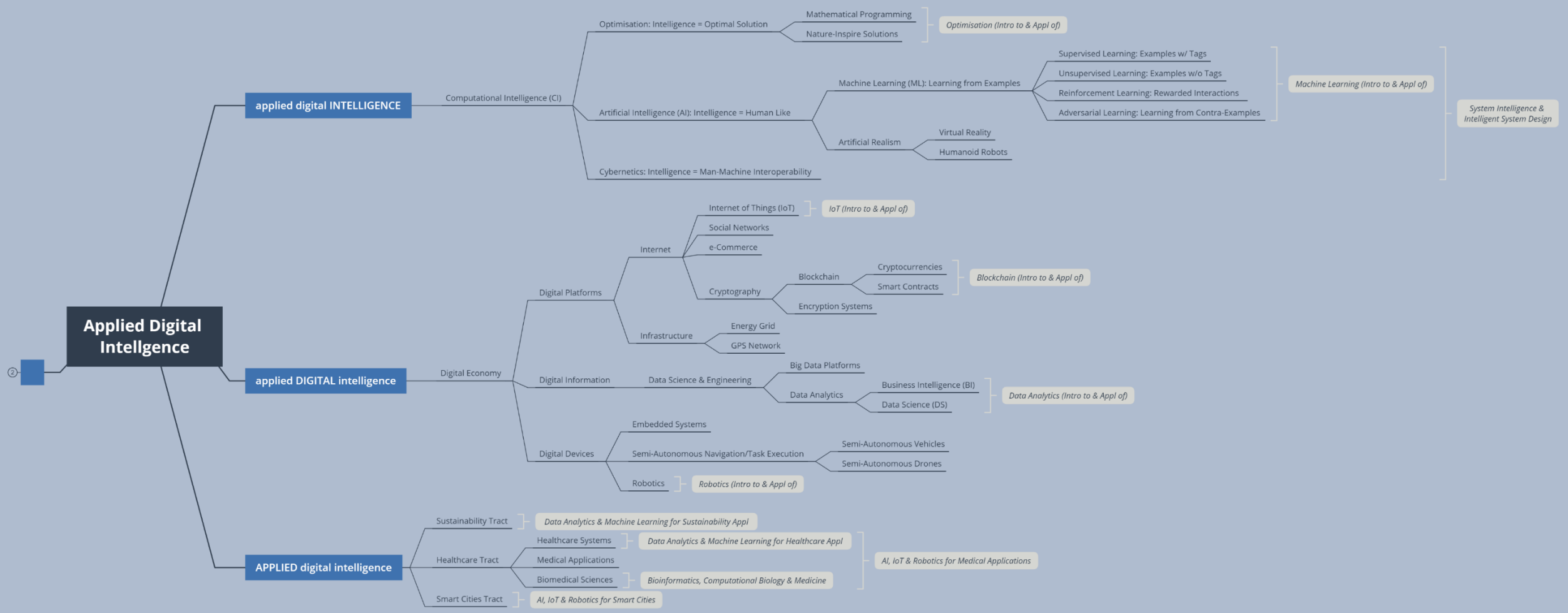
3 Modes of Human Learning

- "Look around, observe, associate arrivals/presences of items/people"
- "Be taught to recognise items/people, to associate them by names"
- "Make long-term connections: circumstance-action-consequence"

3 Paradigms of Machine Learning

- Unsupervised Learning ← dataset $\{x_i\}$
- Supervised Learning ← I/O-dataset $\{x_i, y_i\}$
- Reinforcement Learning ← simulated environment/response function

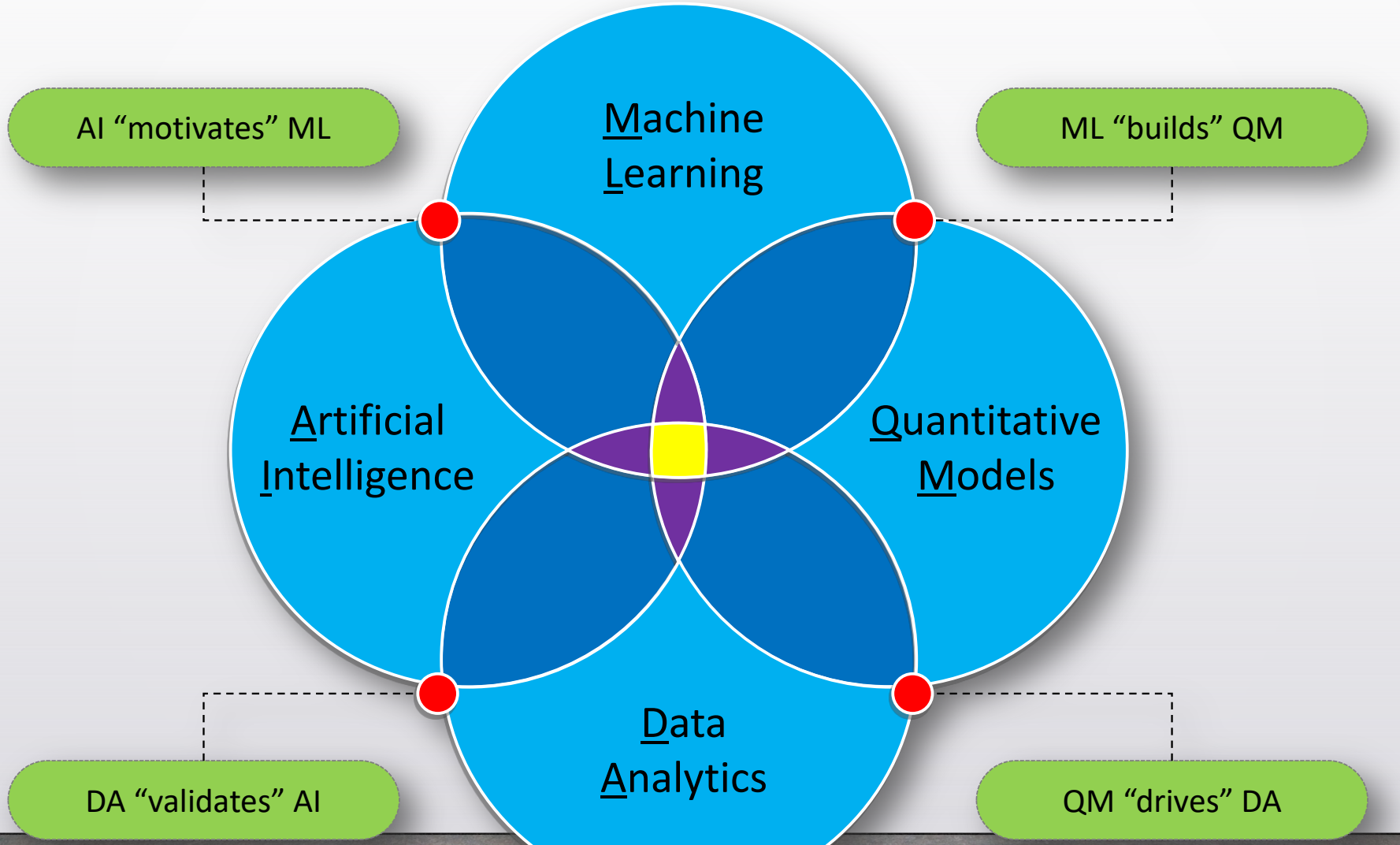
APPLIED ◀ DIGITAL ◀ INTELLIGENCE ◀



II. BIG DATA – the story so far (hype vs. reality)

- **VOLUME** – *ทรัพยากร หรือต้นทุน? – Data Management Challenges*
- **VARIETY** – *หลากหลาย คือดีกว่าเสมอไป? – Data Science Opportunities*
- **VELOCITY** – *รวดเร็วพร้อมความปลอดภัย? – Data Engineering Challenges*

AI ◀▶ ML ◀▶ QM ◀▶ DA


AI “motivates” ML
ML “builds” QM
Machine Learning
Artificial Intelligence
Quantitative Models
Data Analytics
DA “validates” AI
QM “drives” DA

III. BIG DATA – as catalyst for/driver of AI/ML/QM/DA

- *late 1980s* >>> ARTIFICIAL NEURAL NETWORK (ANN) >>>

  "can universally learn x → y, as long as x is a numerical vector, etc."

- *early 2010s* >>> CONVOLUTIONAL NEURAL NETWORK (CNN) >>>

  "learning *convolutional filer* turns digital images into numerical *signals*"

- *Mid/late 2010s* >>> NATURAL LANGUAGE PROCESSING (NLP) >>>

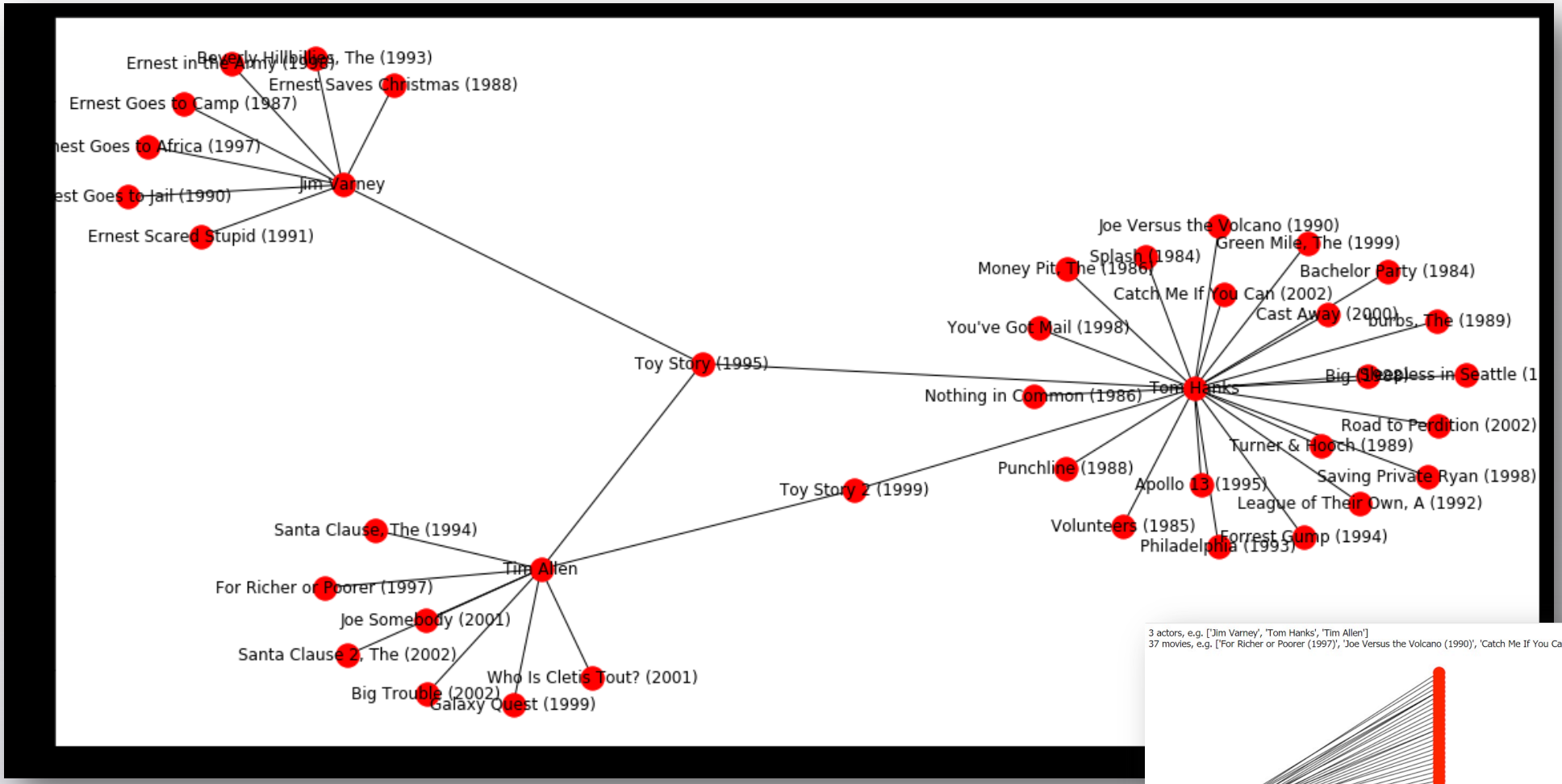
  "learning *word representation* w/ closeness reflecting *context*"

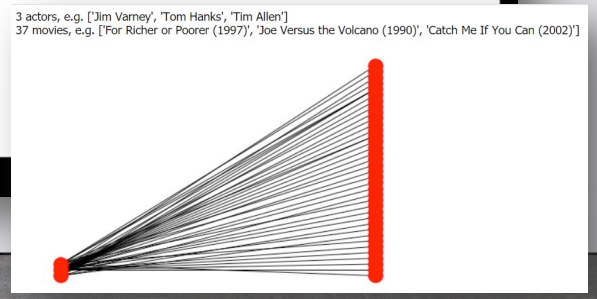
- *late 2010s/early 2020s* >>> GRAPH NEURAL NETWORK (GNN)* >>>

  "learning *node representation* w/ closeness reflecting *connectivity*"

1 Connected Bipartite Graph

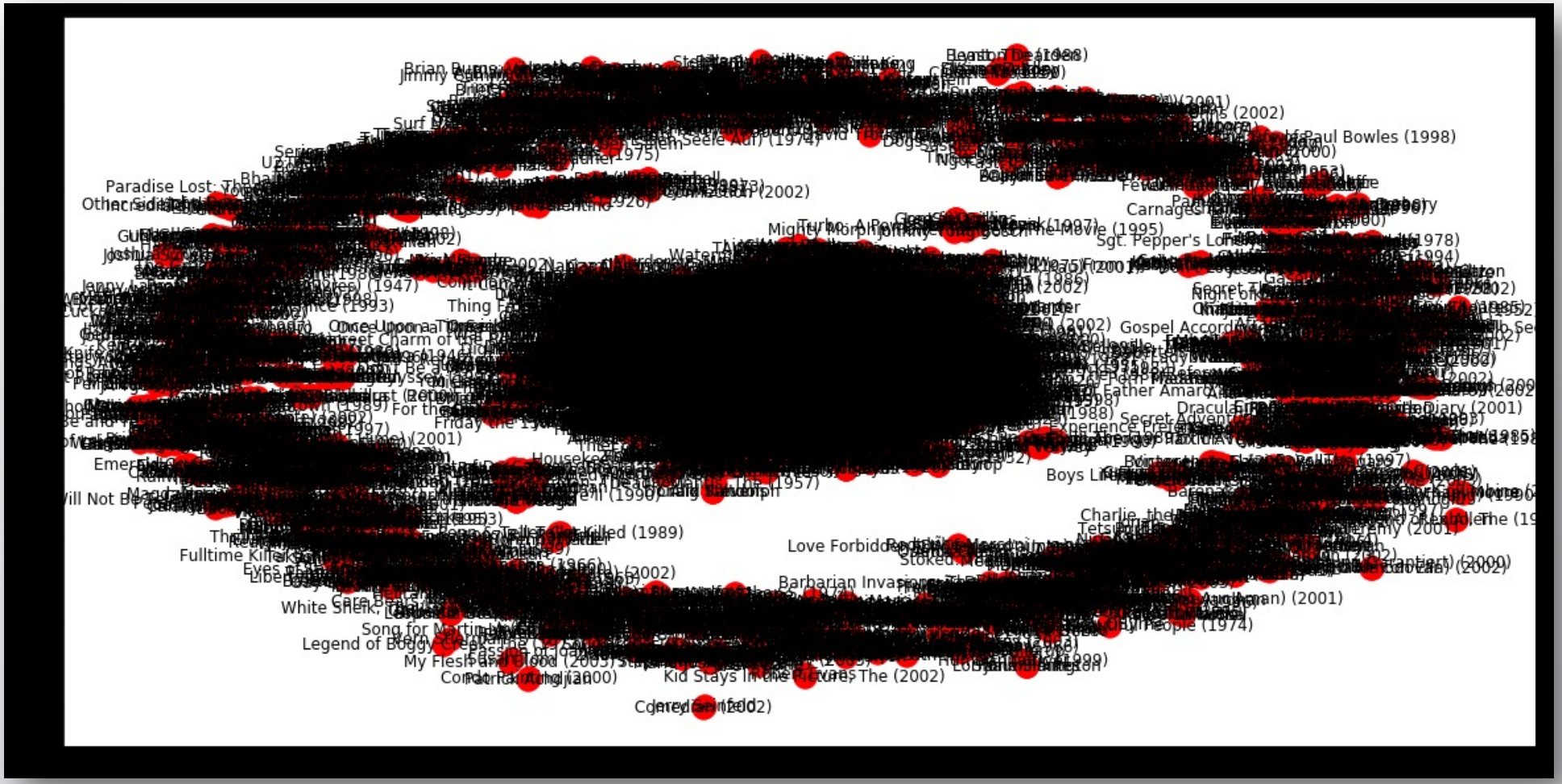
← 40 edges (actor-movie pairings)





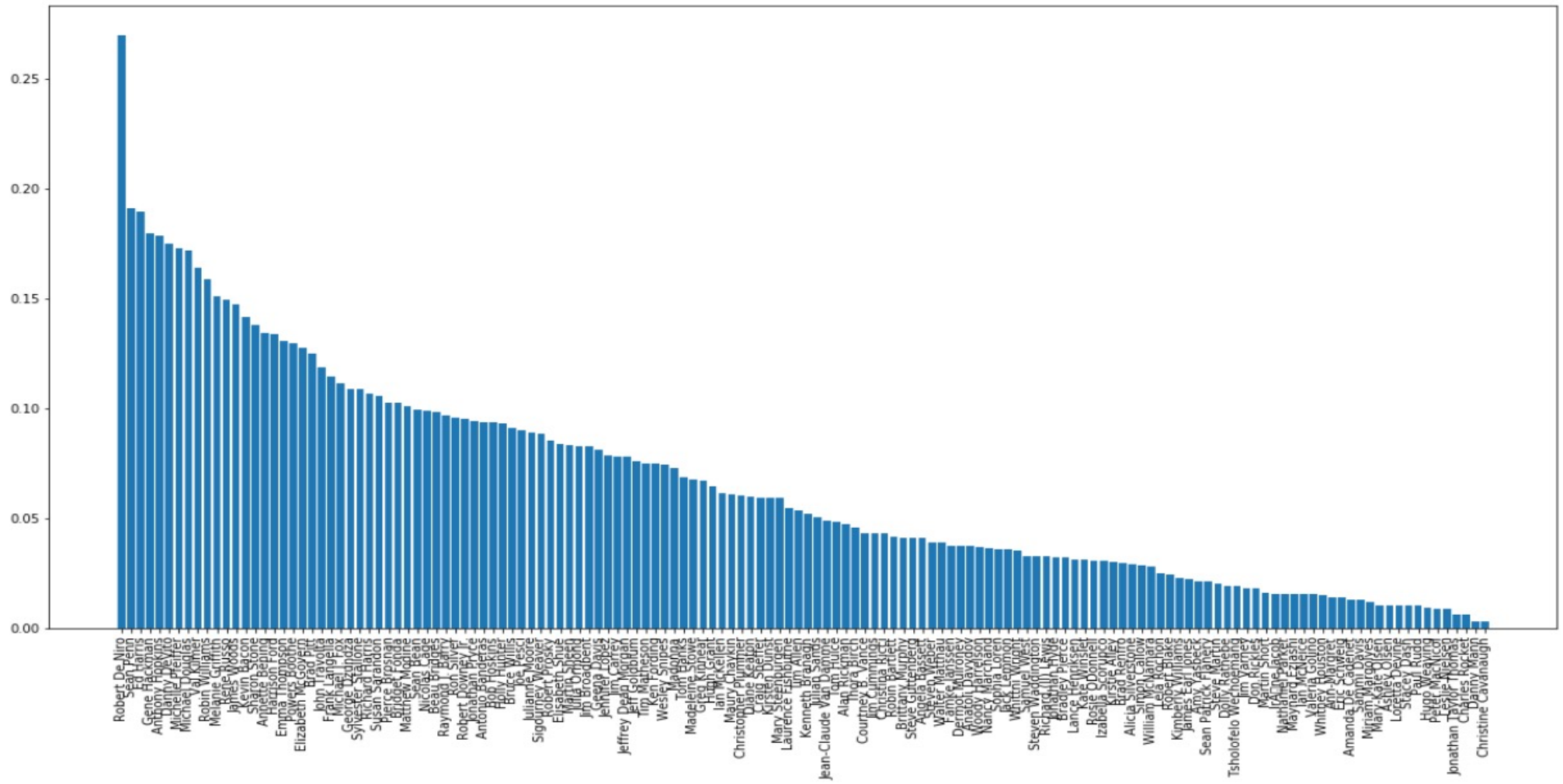
Connected Bipartite Subgraphs

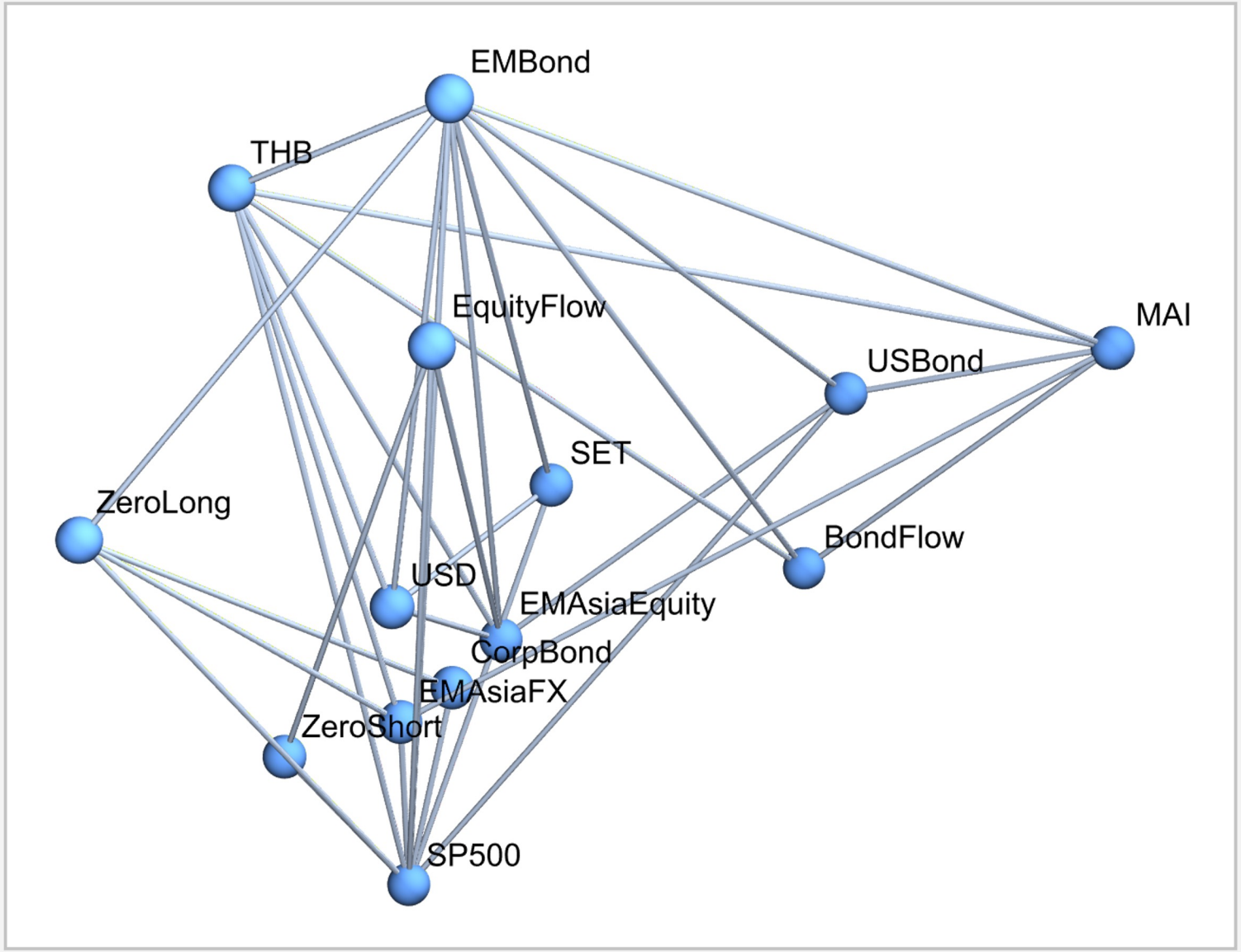
← 14,614 nodes & 21,399 edges



Eigenvector Centrality – Adjacency Matrix

← (144) Actors





affinity BivarCopula_2D

in3D ☑

useGraphEmbed ☑

IV. (การจัดการ)องค์กรยุคดิจิทัล – *why* BIG DATA

- หลักเศรษฐศาสตร์ – “Moore’s Law” *(nearing the end thereof)*
- ปรากฏการณ์ – “Human Digital Trails”✵ *(artifact of Transhumanism 1.0)*
- หลักการตลาด – “Know Your Customers” *(predictability or malleability?)*
- หลักธุรกิจ – “Keeping up with the Jones” *(consultancy industry fuel)*
- หลักคณิตศาสตร์ – Solving the “Measurability/Dimensionality✵” problems

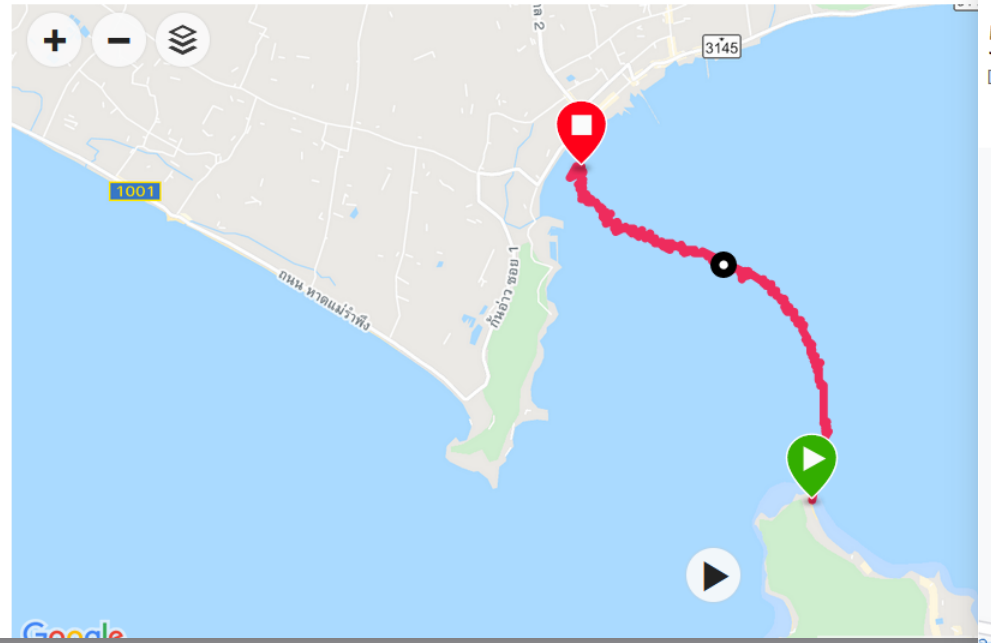
"Internet-of-Things getting very personal!"

OTHER ▼ BY POOMJAI NACASKUL, PH.D. ON 2011 DECEMBER 11 @ 09:07

Openwater Swimming

Event Type: Race ▼ Gear: Add

7.41 km	4:00:38	1.9 kph
Distance	Time	Avg Speed

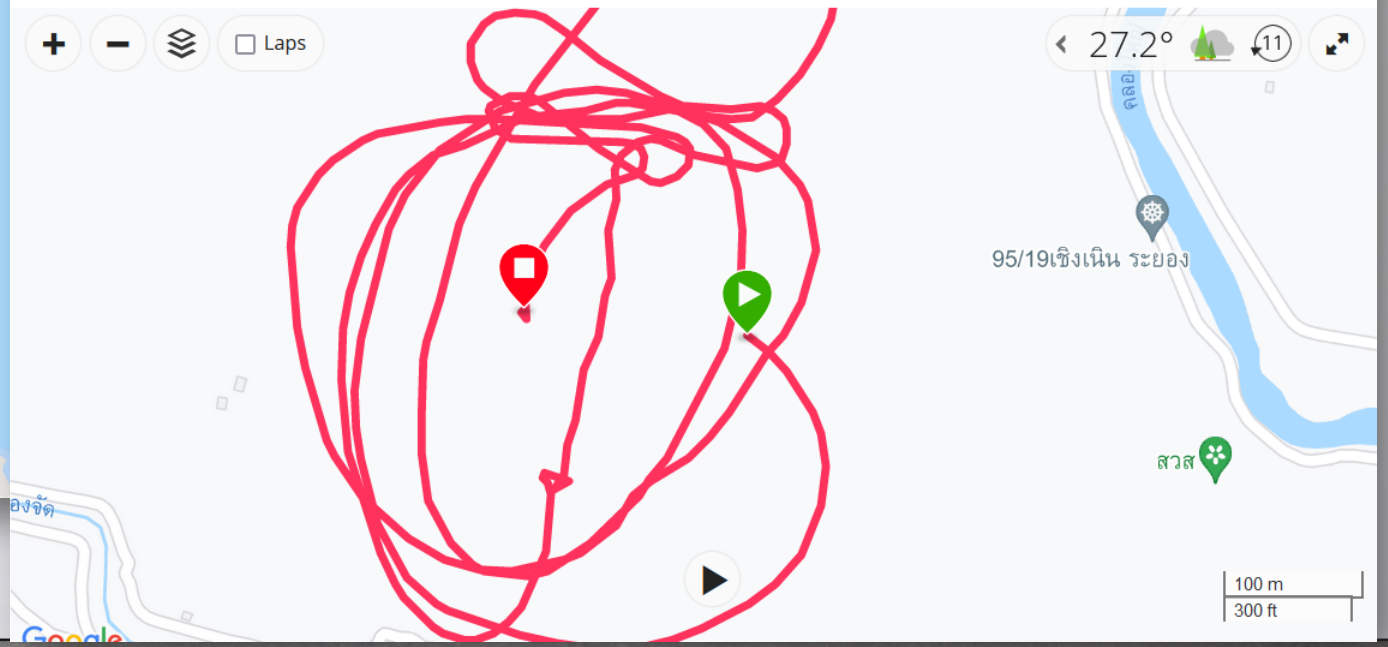


OTHER ▼ BY POOMJAI NACASKUL, PH.D. ON 2014 MARCH 9 @ 07:0

Paramotor #8, #9

Event Type: Uncategorized ▼ Gear: Add

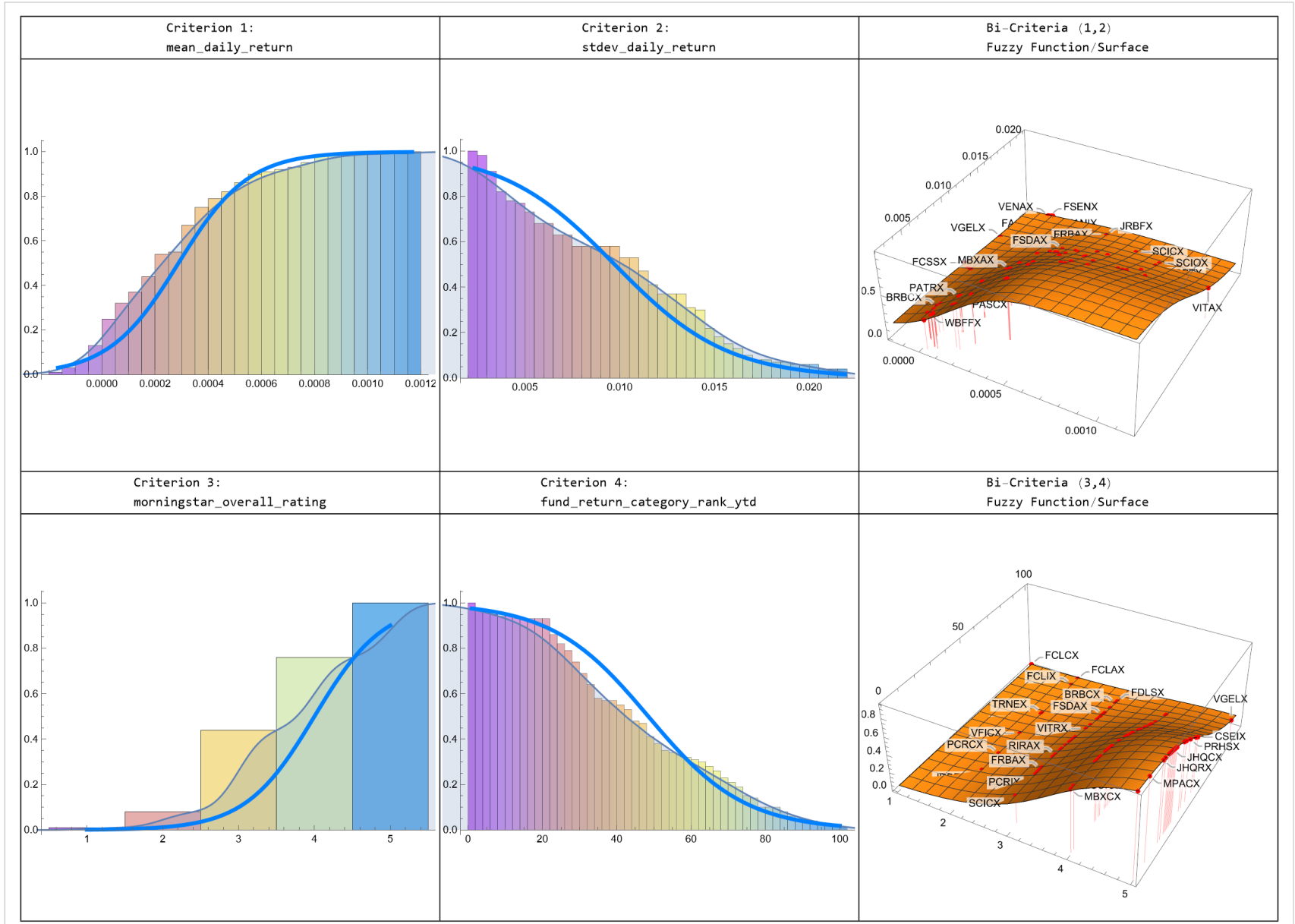
5.47 km	12:24	26.5 kph	166 m	241 C
Distance	Time	Avg Speed	Elev Gain	Calories



My Paramotor Flight (Autumn 2013, Clip #1)

IV. (การจัดการ)องค์กรยุคดิจิทัล – *what* BIG DATA

- Tabular Database – status quo, still reigns supreme
- Public Domain/Archive - deconstructing intellectual property
- Metadata – time-stamped, geo-tagged, sentiment-labelled/annotated
- Simulacrum – deepfake, virtual reality, gamification*, metaverse



Fuzzy Quad-Criteria Portfolio Optimisation

Poomjai Nacaskul, Ph.D.

2022.12.02

criterion1 mean_daily_return

alpha1 0.01 0.02 0.05 0.1 0.2

criterion2 stdev_daily_return

alpha2 0.01 0.02 0.05 0.1 0.2

join12with PNFuzzyAND PNFuzzyOR PNFuzzyADD PNFuzzyCOMBI

w1vs2

criterion3 morningstar_overall_rating

alpha3 0.01 0.02 0.05 0.1 0.2

criterion4 fund_return_category_rank_ytd

alpha4 0.01 0.02 0.05 0.1 0.2

join34with PNFuzzyAND PNFuzzyOR PNFuzzyADD PNFuzzyCOMBI

w3vs4

w12vs34

maxalloc 0.01 0.02 0.05 0.1 0.2 0.5 1

view3D

labelFund

sizeimage

IV. (การจัดการ)องค์กรยุคดิจิทัล – *how* BIG DATA

- Organisational-Institutional History/Experience/DNA = Data *Asset*
- Pay to(for) Scale vs. Digital *Surrender*
- General Data-Analytics *Literacy*
- หลักปรัชญาเศรษฐกิจพอเพียง Sufficiency Economy Philosophy –
  - ความพอประมาณ Moderation
  - ความมีเหตุผล Causal Nexus
  - ความมีภูมิคุ้มกันในตน *Resilience*

Chulalongkorn University | CHULALONGKORN SCHOOL OF INTEGRATED INNOVATION

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