

Industry-Academia Tour

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Economics and Computation Lab,
Department of Computer Science & Engineering,
National Taiwan Ocean University

9 October 2025



Outline

- 1 Self Introduction
- 2 Teaching Courses
- 3 Focus of The Junior Project



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Welcome to our lab:
Economics and Computation Laboratory



Me @ University of Tokyo, January 2024.



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Background	Research	Curriculum Vitae	Running
Mathematics Genealogy	Teaching	Publications	Interest



Education

- BS.: Mathematics, National Cheng Kung University
- MS.: CSIE, National Chi Nan University
 - Supervisor: R. C. T. Lee
[Algorithms](#)
- Ph.D.: CSIE (2011), National Chung Cheng University
 - Supervisors: Maw-Shang Chang & Peter Rossmanith
[FPT + Randomized Algorithms](#)



Work Experience

- Postdoc in Academia Sinica (2011–2018).
- *Quantitative Analyst* (intern) @ Point72/Cubist Systematic Strategies (2018–2020).
- *Quantitative Analyst* @ Seth Technologies Inc. (2020–2021).
- Assistant Professor @ Dept. CSIE, Tamkang University (2021–2024).



Research Interests

- **Algorithmic Game Theory**

- Equilibrium Computation, Computational Social Choice, Mechanism Design, etc.

- **Machine Learning Theory**

- Online Learning with No-Regret, Bandit Problems, etc.

- **Design of TCS Algorithms**

- Randomized Algorithms, Fixed-Parameter Algorithms, Approximation Algorithms, Online Algorithms.



Ongoing Projects

- *Algorithmic Game Theory with Machine-Learned Predictions.*
 - Taiwan (NSTC) \leftrightarrow Netherlands (NWO)
 - Period: July 2025–June 2025).
- *Parameterized Online Learning for Min-Max Envy Resource Allocation and Team Formation.*
 - Taiwan (NSTC) \leftrightarrow France (BFT)
 - Period: January 2024–December 2025.
- *A Study on Group Competition Game of Real-Policy Making Based on Equilibria Existence and Gradient Algorithms.*
 - Independent NSTC Project
 - Period: August 2023–July 2026.



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Teaching Courses

- Undergraduates:
 - Introduction to Programming (II) [EMI]
 - **Data Structures**
- Graduates:
 - Economics and Computation [EMI]
 - Randomized Algorithms [EMI]
 - **Mathematics for Machine Learning** [EMI]



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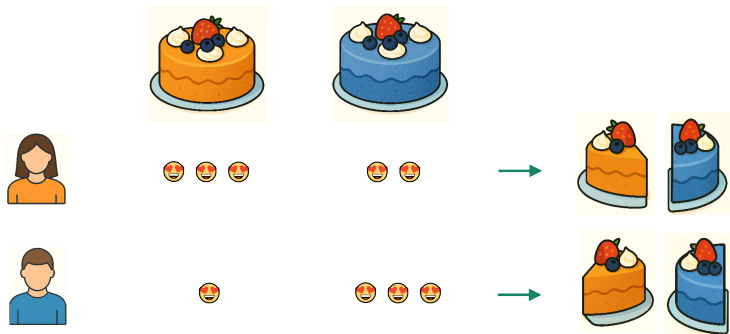
Some fairness concepts



Some fairness concepts



Some fairness concepts



Envy-freeness for allocating indivisible goods

Two-Partition Problem

Given a multiset S of positive integers, determine if it is possible to partition S into two disjoint subsets, say S_1 and S_2 , such that the sum of the integers in S_1 is equal to the sum of the integers in S_2 .

- $S = \{1, 5, 11, 5\}$



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- $S = \{1, 5, 11, 5\}$
- $S_1 = \{11\},$
 $S_2 = \{1, 5, 5\}.$
- $S = \{3, 5, 8, 10, 11, 14, 17, 19, 21, 22, 25, 33\}.$
- $S_1 = \{33, 25, 22, 14\},$
 $S_2 = \{3, 5, 8, 10, 11, 17, 19, 21\}.$



Envy-freeness for allocating indivisible goods

NP-complete

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Envy-free up to any good (EFX)

EFX

$\mathcal{A} = (A_1, \dots, A_n)$ is an EFX allocation of a set M of indivisible goods to a set N of agents if for every pair of agents $i, j \in N$ it holds that

$$v_i(A_i) \geq v_i(A_j \setminus \{g\}) \text{ for every good } g \in A_j,$$



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Example

Agents $N = \{1, 2, 3\}$; goods $M = \{a, b, c, d, e\}$. All agents share the same additive valuation v with $v(a) = v(b) = v(c) = v(d) = v(e) = 1$,
Then $A_1 = \{a, b\}$, $A_2 = \{c, d\}$, $A_3 = \{e\}$ is an EFX allocation.



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- **OPEN PROBLEM:** Does there always exists an EFX allocation for m indivisible goods to $n \geq 4$ agents?



Thank you!

Questions?

