컴퓨터공학부 학부생

해외 연구기회 프로그램(International-UROP) 공고

컴퓨터공학부 학부생에게 외국대학 명망있는 교수님과의 연구기회를 제공

- Prof. Euiwoong Lee (University of Michigan) : https://web.eecs.umich.edu/~euiwoong/

[International-UROP]

- 기간: 2023년 7월 ~ 8월 중 현지 연구실
- 선정예정인원: 1명
- 왕복항공비 제공

[신청방법 및 선정 일정]

- 지원서류 제출
  - 기간 : 2023년 3월 20일(월) ~ 4월 07일(금)까지
  - 제출방법 : 구글설문지 제출 https://forms.gle/48MQds4raV7nW1Ng8
- 면접 대상자 안내 : 2023년 4월 11일(화) - 개별 연락

신청(구글설문지) QR 코드

Euiwoong Lee

I am an assistant professor in the Computer Science and Engineering Division at the University of Michigan. Previously, I was a postdoc at New York University hosted by Oded Regev and Subhash Khot, and a research fellow at Simons Institute for the Theory of Computing. I received my PhD from Carnegie Mellon University, where I was advised by Venkatesan Guruswami and my thesis won the Edmund M. Clarke Doctoral Dissertation Award. I was supported by Samsung Scholarship and Simons Award for Graduate Students in TCS.

With Greg Bodwin, I am organizing Michigan Theory Seminar. Please reach out any of the organizers if you would like to give a talk!

Email

(First name with eight letters) at umich dot edu

Teaching

EECS 498-004: Algorithms for Data Science. Winter '22. (Canvas)
EECS 376: Foundations of Computer Science. Fall '21. (Canvas)
EECS 586: Design and Analysis of Algorithms. Winter '21. (Canvas)
EECS 598-010. Approximation algorithms and Hardness of approximation. Fall '20. (Canvas)

Interests and Current Research

Approximation algorithms and Hardness of approximation
Connection between discrete and continuous optimization
Convex hierarchies (e.g., Sum-of-Squares, Sherali-Adams)
Parameterized complexity

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서울대 학부 연구 프로그램 (UROP)

Approximation Algorithms for Euclidean Facility Location

- 어떤 서비스를 원하는 client들이 여러 곳에 분포해 있을 때, 어느 곳들에 facility들을 지어야 사회적 비용을 최소화 할 수 있을까?

- Facility Location은 산업공학과 컴퓨터과학, 기하학을 이어주는 중요한 최적화 문제이며, clustering과도 밀접한 관계에 있다.

- Euclidean space의 성질을 이용하여 더 나은 성능을 보장하는 알고리즘을 만들어 보자.

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Approximation Algorithms for Euclidean Facility Location

Euiwoong Lee (University of Michigan)

- Given a set of points X where distance $d(x, y)$ is well defined for any pair of points $x, y \in X$, along with the *facility cost* $\lambda \in \mathbb{R}^+$, the FACILITY LOCATION problem asks to find $S \subseteq X$ to minimize $\lambda|S| + \sum_{i \in X}(\min_{j \in S} d(i, j))$; intuitively, we build a *facility* for each $i \in S$ by paying λ, every point $i \in X$ is *connected* to the closest facility, and the total cost is the sum of the facility costs and the connection costs.
- It is one of the most fundamental optimization problems in computer science and operations research, and is closely related to clustering (e.g., k-MEANS and k-MEDIAN).
- It is NP-hard to find the exactly optimal solution, but *approximation algorithms*, which return an approximately optimization solution in polynomial time, have been actively studied for decades. Now we have a relatively good understanding when the distance $d(.,.)$ forms a *metric* (i.e., d satisfies *triangle inequality* $d(i, j) + d(j, k) \geq d(i, k)$ for all $i, j, k \in X$).
- The main goal of this project is: **Design a better approximation algorithm for Facility Location in the Euclidean metric**, which means that we assume $X \subseteq \mathbb{R}^\ell$ for some dimension $\ell \in \mathbb{N}$ and $d(i, j) = \|i - j\|_2$ for $i, j \in X$. Surprisingly, there is no algorithm for the Euclidean metric that guarantees a strictly better approximation ratio than the one for general metrics above. Given that the Euclidean metric is the most widely used metric, it will be a challenging but meaningful result.
- Prerequisite: Basic knowledge in design and analysis of algorithms, mathematical maturity, and interest in approximation algorithms.