[AICP 2023] Final Report

❒ Team Information

Research Topic	EN	Cohesive Subgraphs Discovery in Social Networks			
	KR	소셜 네트워크에서 응집성을 갖는 서브그래프 식별			
Team Name		**데이터 유람단**			
Professor		김정훈 Junghoon Kim	Dept.	CSE & AIGS	
TA		Student No.	Name	Dept.	
		-	-	-	
Team Members		Student No.	Name	Intern-ship*	Dept.
	1	20181176	Minsik Lee	3	CSE
	2	20191161	Woocheol Shin	3	CSE
	3	20181173	Kyu Hwan Lee	3	CSE
	4	20211173	Jaeyun Shim	3	CSE
	5	20211186	Sunwoo Yeom	3	CSE
	6	20221417	Seongsik Hwang	3	CSE

***[Undergrads Only] Research Internship**: 2023년 AICP 활동내역으로 연구인턴십 학점을 신청한 학부생들은 **본인의 신청학점(1~3학점)을 표기**해주시기 바랍니다. / If you have applied for research internship credits through the AICP activities, please **leave how many credits (1-3 credits) you have applied for.**

❒ Abstract

Keywords	Social networks, Graphs, Cohesive subgraph

With the advancement of IT and mobile technology, social networks that represent relationships as graphs have become universally accessible. The goal of this study is to identify cohesive subgraphs within these networks. We have recently studied and implemented cohesive-based models to evaluate their applicability to tasks such as recommender systems. The goal is to guide researchers in selecting the most appropriate cohesive-based model and improve problem-solving skills through practical application.

IT와 모바일 기술의 발전으로 관계를 그래프로 표현하는 소셜 네트워크는 보편적으로 접근 기능해졌습니다. 이 연구의 목표는 이러한 네트워크 내에서 응집력 있는 하위 그래프를 식별하는 것입니다. 우리는 응집성-기반 모델을 연구하고 구현하여 최근 추천 시스템과 같은 작업에 대한 적용 가능성을 평가하고자 합니다. 연구자들이 가장 적합한 응집성-모델을 선택하도록 안내하고 실제 활용을 통해 문제 해결 능력을 향상시키는 것이 목표입니다.

❒ Research Contents

1. Member's Role

	Name	Role	Details
1	Minsik Lee	Manage the entire project	K-tip, k-wing algorithm thesis study in progress, Real-world dataset collection, Synthetic dataset & real-world dataset preprocessing, Implement the main function to conduct the experiment, Implementation of community evaluation, Experiment progress and summary of experiment results
2	Woocheol Shin	Compare algorithms & writing the paper	Studying "A benchmarking tool for the generation of bipartite network models with overlapping communities" for an experiment that could compare multiple algorithms, Creating the BNOC synthetic dataset and writing the experimental part of the paper.
3	Kyuhwan Lee	Algorithm Study & Implement ation	Studying k-tips, k-wings, biLouvain, and spec papers and implementing algorithms or applying implemented algorithms.
4	Jaeyun Shim	Algorithm Study & Implement ation	Studying BiTruss, and BiPlex papers and implementing algorithms or applying implemented algorithms.
5	Sunwoo Yeom	Algorithm Study & Implement ation	Studying LPAb, LPAb+, and co-clustering papers and implementing algorithms or applying implemented algorithms
6	Seongsik Hwang	Algorithm Study & Implement ation	Studying BiNE, deepCC and BiGi papers and implementing algorithms or applying implemented algorithms.

2. Participants' Comments

(Professor) The AICP team, composed of CSE students from the 2nd to 4th years, conducted the research well. The topic I researched was more related to Data Science than core-AI, focusing on implementation and analysis of experimental results. Through these processes, I hope the students broadened their horizons on data science, data analysis, and data engineering. It was a fruitful time.

(TA) -

(Team members)

- Minsik Lee

AICP was a great experience leading a project involving many people. Through this experience, I was able to really feel the importance and utility of appropriate division of labor, and I believe that if I have another opportunity like this, I will be able to show even more progress. In addition, by actually dealing with and analyzing what I had only learned in theory, I encountered problems and difficulties in unexpected areas. I believe that these experiences are also valuable values that can be gained through AICP, and based on this, I can prepare for unexpected variables in other projects as well. I think I was able to develop the ability to overcome it by considering it.

- Woocheol Shin

I gained many important experiences while participating in this AICP project, which compares and analyzes various algorithms for identifying subgraphs in bipartite graphs. By reading the paper to understand the characteristics of each algorithm, I was able to understand the unique characteristics of each algorithm and the research motivation behind them. Participating in this AICP provided an opportunity to understand and experience the entire research process, from writing papers to comparing algorithms.

- Kyuhwan Lee

I learned that it takes a lot of time and effort to actually implement the algorithm in the door, and that there are many barriers to entry. In addition, I had a good experience breaking the prejudice I had about mathematics in that mathematics interpreted and explained algorithms more than I thought. In the future, I would like to improve my ability to read papers from a mathematical perspective, which is often mentioned in papers, and the coding capabilities necessary to implement the paper's algorithms.

- Jaeyun Shim

By participating in this AICP, I was able to learn how papers in the field of computer engineering are structured by reading papers and implementing the content of the papers myself. I was also able to indirectly experience how to write a paper by actually writing a report in the form of a paper. It was good. It was also a meaningful experience as I was able to meet new people who were interested in the same field and share many stories.

- Sunwoo Yeom

It was a pleasure to have the opportunity to study network algorithms. It is rare to have the opportunity to work with professors during school life, so it was a refreshing experience to work with them.

- Seongsik Hwang

While conducting a research project, I learned several things. In particular, I experienced first-hand that simply understanding a single paper in depth requires extensive background knowledge in the field and a considerable amount of time and effort. Even while implementing the contents of the paper, a lot of programming knowledge was required, and it was not easy to solve all the problems alone. I realized that sometimes it is more effective to overcome a problem with the help of others. Through this experience, I wanted to continue to expand my knowledge in the data field by delving deeper into more papers in the future.

We hereby submit the final report for the AICP in 2023 as stated above.

Date: 10 / 31 / 2023

Professor: Junghoon Kim (Signature)

Student leader: Minsik Lee (Signature)