Titles and Abstracts

16. **Speaker**
Ran Duan IIIS Tsinghua University

Title:
Combinatorial algorithm for linear Arrow-Debreu market

Abstract:

We present a combinatorial polynomial-time algorithm for computing the equilibrium of Arrow- Debreu model with linear utilities. Arrow-Debreu model was formulated by Walras in 1874, and it is central to the theory of general economic equilibrium and it is often used as a general reference for other microeconomic models. Our algorithm views the allocation of money as flows and iteratively improves the balanced flow as in [Devanur et al. 2008] for Fishers model. We develop new methods to carefully deal with the flows and surpluses during price adjustments. For a market with n agents and integral utilities bounded by U, the algorithm runs in $O(n7 \log3(nU))$. This is the fastest algorithm so far for computing the exact equilibrium of linear Arrow-Debreu market.

1.
Speaker Yuqing Kong is a PhD candidate in University of Michigan (expected to graduate in April 2018) and interested in the intersection of theoretical computer science and the areas of economics: information elicitation, prediction markets, mechanism design, and the future applications of these areas to crowdsourcing and machine learning. She received a Bachelor of Science degree in mathematics from University of Science and Technology of China in 2013.

Title:
Eliciting and Aggregating Information: An Information Theoretic Approach

Abstract:

Crowdsourcingoutsourcing tasks to a crowd of workers (e.g. Amazon Mechanical Turk, peer grading for massive open online courseware (MOOCs), scholarly peer review, and Yahoo answers)is a fast, cheap, and effective method for performing simple tasks even at large scales. Two central problems in this area are: (1) Information Elicitation how to design reward systems that incen- tivize high quality feedback from agents; and (2) Information Aggregation how to aggregate the collected feedback to obtain a high quality forecast. Recently, great process has been made in crowdsourcing, especially in the situation where there is no ground truth. However, the techniques used in this literature are ad hoc and sometimes lack deep intuition. Moreover, the literature also lacks a deep connection between information elicitation and information aggregation. The combination of game theory and learning theory has made innova- tive progress (e.g. Generative Adversarial Networks) recently. A central contention of this talk is that the combination of game theory, informa- tion theory, and learning theory brings a unified framework to both of the central problems in crowdsourcing area. In this talk, I will introduce sev- eral innovative connections

among game theory, information theory, and learning theory from my work and show that how to use the connections to build a unified framework and make new progress in crowdsourcing.

18 Speaker

Wei Chen Microsoft Research Asia

Title:

Influence Maximization: A Test Ground for Submodular Optimization, Online Learning, Game Theory, etc.

Abstract:

Influence maximization is the task of selecting k seed nodes in a social network such that the influence spread of the seeds is maximized. It models the viral marketing scenario, and can also be applied to other sce- narios such as cascade monitoring and rumor control. Since proposed 15 years ago, influence maximization and its variants have been extensively studied, and the area is still actively growing. In this talk, I will first briefly introduce the core research problems in influence maximization including scalable algorithm design and diffusion model design and anal- ysis. Then I will demonstrate the richness of the influence maximization research domain by showing that it can be connected to many related re- search areas, such as submodular optimization, online learning, and game theory. Effectively, we could use influence maximization as a test ground to concretely study many problems in these areas, and such joint studies may also lead to new findings back in their home domains.

10. **Speaker** Changjun Wang wcj@bjut.edu.cn Beijing Institute for Scientific and Engineering Computing, Beijing University of Technology

Title:

A Tractable Network Game of Atomic Dynamic Flows

Abstract:

Selfish routing, where selfish agents compete in a network for traveling from their origins to their destinations as fast as possible, is dynamic in nature. However, cap- turing this dynamic with a tractable model is challenging, especially when agents are atomic. We propose a network game model that not only makes a good simu- lation of dynamic flows, but also possesses a number of theoretical and algorithmic tractabilites. The congestion is modeled by deterministic queuing which happens when edge capacities are not enough to allow simultaneous transits of all agents over there. The edge-priority tie-breaking rule for entering queues is the key to assuring tractabilities, which stand in contrast to previous related negative results. We study the Nash equilibrium (NE) for nonadaptive agents who select and fix their own origin-destination paths simultaneously at the very beginning. We constructively prove that an NE exists for multiple-origin single-destination networks. We characterize all the NEs with a feature that late agents have no way to affect early agents. This char- acterization implies that each NE possesses many desirable properties such as weak Pareto efficiency and global First-In-First-Out. We design efficient algorithms for computing both an NE of the game and a best-response of any agent. Building on the results for NEs, we investigate an unexplored area of atomic dynamic routing

games the subgame perfect equilibrium (SPE) for adaptive agents who make an on-line decision at each nonterminal vertex they reach as to which next edge to take. We prove that in a single-destination network an SPE always exists, and further that every NE of nonadaptive agents is realizable by some SPE of adaptive agents, which builds a bridge

15. **Speaker**

Qi Qi Department of Industrial Engineering and Decision Analytics The Hong Kong University of Science and Technology, Hong Kong,

Title:

Auction or Lottery: Balancing Efficiency and Equality in Vehicle Licenses Allocation

Abstract:

Due to traffic and air quality concerns in urban cities, many big cities have begun to adopt the vehicle licenses quantitative control policies. In these cities, a limited number of vehicle licenses are allocated among a very large number of potential car buyers every one or two months. The current allocation mechanisms differ from city to city. Sev- eral mechanisms have been developed and implemented in reality, such as auction, lottery, lottery with reserved price, and the simultaneous auction and lottery. In this work, we target to design the optimal mech- anism to balance efficiency and equality in practice. We first propose a unified two-group mechanism framework that either includes or outper- forms all the existing mechanisms. Besides, the unified framework also leads to easy implementation in reality due to its truthfulness and simple structure. Under this framework, assuming the players private values are drawn independently from a common distribution, we prove the optimal mechanism is always sequential auction and lottery. Besides, the optimal allocation rule depends only on the total number of players and the total number of licenses for all commonly used distributions. We then extend the two-group framework to a general multi-group framework. The ex- perimental results show us the optimal two-group mechanism is the best choice in practice. Thus, our work provides an effective tool for social planner to design truthful mechanisms to maximize the social efficiency under any equality level. We also discuss possible applications of our result to resource allocation in other settings.

17. **Speaker**

Vittorio Bil'o Department of Mathematics and Physics Ennio De Giorgi University of Salento, Lecce - Italy

Title:

Uniform Mixed Equilibria in Network Congestion Games with Link Failures **Abstract:**

Motivated by possible applications in faulttolerant routing, we introduce the notion of uniform mixed equilibria in network congestion games with adversarial link failures, where players need to route traffic from a source to a destination node. Given an integer 1, a -uniform mixed strategy is a mixed strategy in which a player plays exactly edge disjoint paths with uniform probabilities, so that a -uniform mixed

equilibrium is a tuple of -uniform mixed strategies, one for each player, in which no player can lower her cost by deviating to another -uniform mixed strategy. For games with weighted players and affine latency functions, we show existence of -uniform mixed equilibria and provide a tight characterization of their price of anarchy. For games with unweighted players, instead, we extend the existential guarantee to any class of latency functions and, restricted to games with affine latencies, we derive a tight characterization of both the prices of anarchy and stability.

25. **Speaker**
Kaigui Bian
PKU-Tencent Joint Innovation Lab Peking University, Beijing, China

Title:
Mobile Social Big Data:
WeChat Moments and Network Applications

Abstract:
In parallel to the increase of various mobile technologies, the mobile social network (MSN) service has brought us into an era of mobile social big data, where people are creating new social data every second and everywhere. It is of vital importance for businesses, government, and institutes to understand how peoples behaviors in the online cyberspace can affect the underlying computer network, or their offline behaviors at large. To study this problem, we collect a dataset from WeChat Moments, called WeChatNet, which involves 25,133,330 WeChat users with 246,369,415 records of link reposting on their pages. We revisit three network applications based on the data analytics over WeChatNet, i.e., the information dissemination in mobile cellular networks, the network traffic prediction in backbone networks, and the mobile population distribution projection. Meanwhile, we discuss the potential research opportunities for developing new applications using the released dataset.

11. **Speaker**
QUAN CHEN Shanghai Jiao Tong University

Title:
ENABLING FAIR PRICING AND FAIR SHARING IN DATACENTER THROUGH PRECISE INTERFERENCE PREDICTION

Abstract: Modern private datacenters are being outfitted with accelerators to provide the significant compute required by emerging online services. It is well known that the diurnal user access pattern of user-facing services provides a strong incentive to co-locate applications for better accelerator utilization and efficiency, and prior work has focused on enabling co-location on multicore processors. However, interference when co-locating applications on non-preemptive accelerators is fundamentally different than contention on multi-core CPUs and introduces a new set of challenges to reduce QoS violation. In this talk, I will in- troduce our Baymax system that improves the accelerator utilization in private datacenters while guaranteeing that user-facing services achieve the required Quality-of-Service. Meanwhile, GPUs have also been adopted in public Clouds. However, performance fairness among concurrent applications on GPU, which is critical in public multi-tenant Clouds, is minimally supported.

Targeting the public Clouds, I will introduce an machine learning-based runtime system that enables the fair sharing in public Clouds without any prior knowledge of user programs.

14. **Speaker**

Pinyan Lu ITCS, Shanghai University of Finance and Economics.

Title:

The Value of Information Concealment

Abstract:

We consider a revenue optimizing seller selling a single item to a buyer, on whose private value the seller has a noisy signal. We show that, when the signal is kept private, arbitrarily more revenue could potentially be extracted than if the signal is leaked or revealed. We then show that, if the seller is not allowed to make payments to the buyer and if the value distribution conditioning on each signal is regular, the gap between the two is bounded by a multiplicative factor of 3. We give examples showing that both conditions are necessary for a constant bound on the gap to hold. We connect this scenario to multi-bidder single-item auctions where bidders values are correlated. Similarly to the setting above, we show that the revenue of a Bayesian incentive compatible, ex post individually rational auction can be arbitrarily larger than that of a dominant strat- egy incentive compatible auction, whereas the two are no more than a factor of 5 apart if the auctioneer never pays the bidders and if the dis- tribution is jointly regular. The upper bounds in both settings degrade gracefully when the distribution is a mixture of a small number of regular distributions.

4. **Speaker**

Mengling, Li

School of Economics & Wang Yanan Institute for Studies in Economics (WISE), Xiamen University

Title:

Incentivizing Organ Donation via Different Priority Rules: Theory and Experiment

Abstract:

The shortage of human organs for transplantations is an increasingly severe problem around the world. Deceased donors are the main source of transplanted organs. Organs from deceased donors are usually allocated via priority queues or waiting lists to patients in need of transplantations. To moderate the shortage of organ supply, several recent policy initiatives focus on the design of organ allocation priority rules to influence incentives for deceased donor registration. A well-designed organ allocation rule helps to moderate organ scarcity by improving allocation efficiency and providing stronger donation incentives. This talk discusses the incentives to register as a deceased organ donor under alternative organ allocation rules and the implications for aggregate donation rate and social welfare. We first compare organ allocation rules that prioritize registered organ donors and (or) agents with high value for organ transplant in both theory and laboratory experiments. We next discuss the optimal rule to maximize the deceased donor registration rate and (or) the aggregate welfare. Finally, we examine the effectiveness of a voucher priority rule that generates

a priority voucher for registration of donation, which can be redeemed by the donor directly or inherited by his family members.

3. **Speaker**

Shengyu Zhang Affiliation: Tencent and The Chinese University of Hong Kong

Title:

Several assignment problems in sharing economy

Abstract:

Shared economy is one of the most rapidly developed market models, and it brings many new and interesting algorithmic challenges. A common scenario in shared economy is to have two or more agents to share one item, in which assignment problems naturally arise. In this talk, we will show two examples in this direction, one for roommate assignment and the other for ridesharing. We will show approximation algorithms for the corresponding assignment problems, and mention some questions for future studies.

26. **Speaker**

Xiang Yan Affiliation: Shanghai Jiao Tong University

Title:

A Truthful Protocol in a Sharing Economy

Abstract:

We consider a network resource sharing economy model where each player contributes its resource to be shared by its neighbors on the connections. While a market equilibrium solution is known in the past, we prove its truthfulness in that no player at a node would be able to misreport its connections nor to misreport the amount of its own resource. This work establishes the first concrete mathematical proof for a practical network sharing protocol model to be truthful, a crucial property for sharing and crowdsource protocols to be free of manipulative strategic plays.

based on a joint work with Cheng Deng and Qi

12. **Speaker**

Nick Gravin Shanghai University of Finance and Economics.

Title:

Correlation-robust mechanism design

Abstract:

In this talk we will discuss the correlation-robust framework proposed by Carroll [Econometrica 2017] and our recent developments. In this framework, the seller only knows marginal distributions for each separate item and/or individual bidder but has no information about correlation across di erent items or di erent bidders in the joint dis- tribution. Any mechanism is then evaluated according to its expected pro t in the worst-case, over all possible joint distributions with given marginal distributions. We illustrate the correlation-robust framework in the context of two well studied revenue maximization settings: (i) single-item action with correlated bidders and (ii) multi-item monopoly problem with a single additive buyer. In the rst setting, a single item is

sold via sealed-bid auction to n bidders with potentially interde- pendent (correlated) values for the good. In the second setting, a monopolist seller has n heterogeneous items to sell to a single buyer with additive value for the items. In this talk we describe the approach via a dual Linear Program- ming formulation for the correlation-robust mechanism design prob- lem. This LP avoids explicit construction of the worst-case distribu- tion, which in general may have exponential in the number of items and/or the number of bidders size. We show how this approach can be adopted in a broad range of Bayesian settings with uncertainty about correlated prior distribution.

8. **Speaker** Zhihao Tang
   Affiliation: The University of Hong Kong

Title:
   Monopoly pricing with buyer search

Abstract:
   In many shopping scenarios, e.g., in online shopping, customers have a large menu of options to choose from. However, most of the buyers do not browse all the options and make decision after considering only a small part of the menu. To study such buyers behavior we consider the standard Bayesian monopoly problem for a unit-demand buyer, where the monopolist displays the menu dynamically page after a page to the buyer. The seller aims to maximize the expected revenue over the distribution of buyers values which we assume are i.i.d. The buyer incurs a fixed cost for browsing through one menu page and would stop if that cost exceeds the increase in her utility. We observe that the optimal posted price mechanism in our dynamic setting may have quite different structure than in the classic static scenario. We find a (relatively) simple and approximately optimal mechanism, that uses part of the items as a bait to keep the buyer interested for multiple rounds with low prices, while at the same time showing many other expensive items.

2. **Speaker**
   Minming Li City University of Hong Kong

Title:
   Eliciting and Aggregating Information: An Information Theoretic Approach

Abstract:
   Mechanism Design, as one of the important areas in algorithmic game theory, can be classified into two categories: with money and without money. Facility location game is one of the mostly studied problem in mechanism design without money. Procaccia and tennenholtz proposed and studied the problem back in 2009, where there are n agents on a line and the government will build a facility in a certain location given the agents reported information on their positions. Since every agent wants the facility to be closer to her, the government wants to make sure truth-telling is the best strategy for every agent while achieving some optimization objective. Since then, some bounds on the approximation ratios of the truthful mechanisms have been improved and new models are proposed. In this talk, we will briefly explain the story of the classic model and emphasize on the recent development on new models proposed by us and other groups.

7. **Speaker**
   Yuanxing Zhang
   Peking University

Title:
Optimizing Bandwidth Consumption in Hybrid CDN-P2P VoD Systems

Abstract:
Decentralizing content delivery to edge devices has become a popular solution for saving the bandwidth consumption of CDN when the CDN bandwidth is expensive. One successful realization is the hybrid CDN-P2P VoD system, where a client is allowed to request video content from a number of seeds (seed clients) in the P2P network. In this talk, I would introduce a video push mechanism that lowers the bandwidth consumption of CDN. The system develops a machine learning approach to predict future scarce videos and proactively send them to competent seeds with strong uploading capabilities. Experiments show that the system can significantly save the expenditure of CDN bandwidth under two typical charging policies of Internet service providers.

13. **Speaker**
    Pingzhong Tang IIIS, Tsinghua University

Title:
Large-scale applied mechanism design

Abstract:
In this talk, I will introduce three research projects at the interface of AI and game theory, all within the framework of mechanism design at nationwide scales. The first project aims to design markets for water right, while the second and third aim to design mechanisms that maximize revenue for nationwide mobile applications. The results are a set of mechanisms that satisfy both computation and economics constraints.

19. **Speaker**
    Lirong Xia Affiliation:, Rensselaer Polytechnic Institute (RPI), Troy, NY, USA

Title: Improving Group Decision-Making by Artificial Intelligence
Abstract:
Group decision-making is a fundamental and challenging problem in our society, where a group of agents must make a joint decision despite that they have different and conflicting preferences, as in political elections, meta search engines, rec- ommender systems, crowdsourcing, and many other scenarios. Addressing challenges in group decision-making requires considerations from statistics, economics, and computation. I will give a brief overview of our recent work in developing and leveraging AI techniques to help human beings and software agents make better group decisions, by bridging theory, practice, and education. The main theme is well aligned with the vision set by The One Hundred Year Study on Artificial Intelligence, that the field of AI is shifting toward building intelligent systems that can collaborate effectively

with people, and that are more generally human-aware. Open questions and future directions will also be discussed.

23. **Speaker**
Yang Cai
McGill University

Title:
A Duality Based Framework for Bayesian Mechanism Design

Abstract:
It is well-known by now that the simple mechanisms we see in practice are rarely, if ever, optimal. Recent work has aimed to understand this through the lens of approximation and has successfully shown that while virtually never optimal, the simple mechanisms we see in practice are often approximately optimal. Still, the techniques used to prove these claims were setting-specific and therefore limited their applica- bility to broad settings.

In this talk, we provide a principled approach that is incarnated in a sequence of papers to design and analyze these simple mechanisms based on duality theory. Our approach unifies and improves previous results, and greatly extend known set- tings where simple mechanisms are approximately optimal, i.e. multiple buyers with subadditive val- uations.

5. **Affiliation:**
Wenwei Wang Hong Kong University of Science and Technology

Title:
Mechanism Design with Efficiency and Equality Considerations

Abstract:
In this work, we consider the problem of allocating a set of homogenous resources (goods) among multiple strategic players to bal- ance the efficiency and equality from a game-theoretic perspective. For two very general classes of efficiency measures and equality measures, we develop a general truthful mechanism framework which opti- mally max- imizes the resource holders efficiency while guaranteeing certain equal- ity levels. We fully characterize the optimal allocation rule. Based on the characteri- zations, we show the optimal allocation and corresponding truthful payments can be computed in polynomial time, which means the truthful mechanism is computation- ally feasible.

24. **Speaker**
Bei Xiaohui
Nanyang Technological University, Singapore

Title:
Computing Equilibria in Fisher Markets with Satiation

Abstract:
The concept of market equilibrium is a central and well-established notion in eco- nomics to analyze and predict the outcomes of strategic interaction in large markets. Fisher markets are a fundamental model to study competitive allocation of goods

among rational agents. In this talk, we discuss linear Fisher markets with earning and utility limits. In these markets, either buyers have upper bounds on the amount of utility they want to achieve, or sellers have upper bounds on the amount of money they want to earn. They extend the standard linear Fisher market model with numerous applications in online adword markets and revenue optimization problems. We show a variety of structural and computational results about market equilibria in these markets. The equilibrium price vectors form a lattice, and the spending of buyers is unique in non-degenerate markets. We will also discuss a scaling algorithm to compute a market equilibrium in polynomial time. Moreover, we show how to refine any equilibrium in polynomial time to one with minimal prices, or one with maximal prices (if it exists).

20. **Speaker**
   Ye Du, Southwestern University of Finance and Economics, China.

Title: Constrained No-Regret Learning
Abstract:
   We investigate a dynamic decision making problem with constraints. The decision maker is free to take any action as long as the empirical frequency of the actions played does not violate pre-specified linear constraints. For this purpose, we introduce the constrained no-regret learning model. In this model, the set of alternative strategies, with which a dynamic decision mechanism is compared, is the set of mixed actions that satisfies the set of linear constraints. We show that there is indeed a strategy that guarantees a constrained no-regret learning. This is a joint work with Ehud Lehrer.

21. **Speaker**
   Yukun Cheng
   School of Business, Suzhou University of Science and Technology

Title:
   Recent Studies of Agent Incentives in Internet Resource Allocation and Pricing
Abstract:
   Market makers choose and design market rules to serve certain objectives, such as to maximize revenue from the sales in the case of a single seller and multiple buyers. Given such rules, market participants play against each other to maximize their utility function values on goods acquired, possibly by hiding or misrepresenting their information needed in the implementation of market rules. Todays Internet economy has changed the information collection process and may make some of the assumptions of market rule implementation obsolete. Here we make a fresh review of works on this challenge in the Internet where new economic systems are operated on.

6. **Speaker :**
   Yulong Zeng Affiliation: IIIS, Tsinghua University

Title:
   The price of prior dependence in auctions

Abstract:

In the standard form of mechanism design, a key assumption is that the designer has reliable information and technology to determine a prior distribution over types of the agents. In the meanwhile, as pointed out by the Wilsons Principle, a mechanism should reply as little as possible on the prior type distribution. In this paper, we put forward a simple model to formalize this statement. In our model, each agent has a true type distribution, according to which his type is drawn. In addition, the agent is able to commit to a fake type distribution and bids rationally as if his type were from the fake distribution (e.g., plays a Bayes equilibrium under the fake distributions). We investigate the equilibria of the induced distribution-reporting games among bidders, under the context of single-item auctions. We obtain several interesting findings: (1) the game induced by Myerson auction under our model is strategically equivalent to the first-price auction under the standard model. Consequently, the two games are revenue-equivalent. (2) the second-price auction, a well known prior independent auction, yields (weakly) more revenue than several reserve-based and virtual-value-based truthful, prior-dependent auctions, under our model. Our results complement the current literature which aims to show the superiority of prior-independent mechanisms.

9. **Speaker**
Bo An Nanyang Technological University

Title:
Computational Game Theory for Security: Recent Progresses and Future Directions

Abstract:
Security is a critical concern around the world, whether its the challenge of protecting ports, airports and other critical national infrastruc- ture, or protecting wildlife and forests, or suppressing crime in urban areas. In many of these cases, limited security resources prevent full security cover- age at all times; instead, these limited resources must be scheduled, avoiding schedule predictability, while simultaneously taking into account different target priorities, the responses of the adversaries to the security posture and potential uncertainty over adversary types. Computational game theory can help design such unpredictable security schedules and new algorithms are now deployed over multiple years in multiple applications for security scheduling. These applications are leading to real-world use-inspired research in computa- tional game theory in scaling up to large-scale problems, handling significant adversarial uncertainty, dealing with bounded rationality of human adver- saries, and other interdisciplinary challenges. This talk will discuss some recent research progress and future open directions on computational game theory for security.

22. **Speaker**
Zhigang Cao School of Economics and Management, Beijing Jiaotong University, zgcao@bjtu.edu.cn.

Title:
Cooperative Functions
Abstract:

We study resource pooling games through analyzing the underlying functions that are referred to as the cooperative functions. We focus on nice cooperative functions in that nonemptiness of the core is guaranteed for all related cooperative games. For the one-dimensional case, a cooperative function is nice if and only if it has increasing returns to scale. For the general case, a cooperative function is nice if and only if its Aubin core is nonempty at each point. We characterize concave nice cooperative functions and convex ones and study when a cooperative function always derives a convex game. We provide many applications, including linear production games, EOQ games, and newsvendor games. (joint work with Donglei Du, Changjun Wang, and Xiaoguang Yang)

27. **Speaker**
   Xiaoguang Yang
   Chinese Academy of Mathematical Sciences

Title:
   Evolution of Cooperation and Conditional Dissociation

Abstract:
   In this talk, we first present a brief review of evolution mechanisms of cooperation. Then we give a clean model with conditional dissociation only, which could be viewed as a variant of peer punishment. Supported by both the numerical simulations and the theoretical analysis of Neutrally Stable Strategy we show that conditional dissociation does promote cooperation, no matter whether mixed strategies are allowed or not, but the pure strategies induces more cooperation. Moreover cooperative behavior is favored when waiting time and/or the populations lifespan are longer. We also illustrate the explanation power of our model by the stories in the real world.

28. **Speaker**
   Jialin Zhang
   Institute of Computing Technology, Chinese Academy of Sciences

Title:
   Game Theory in Social Network Application

Abstract:
   In this talk, I will introduce two ongoing research works in our group. Their motivation comes from the social network application in the real- world scenario. We try to use game theory method to model the coop- eration and competition in these situations. The first one is Influence Cooperative Game which captures the stability of cooperation in a loose organization, for example, the live-broadcasting platforms. We want to design a stable allocation method to avoid the partition. Secondly, we consider Influence Exchange Game, which tries to model recommendation- s between different mobile apps or promotions between different WeChat official accounts. However, in these work, either the result or the mod- el itself is not satisfactory. I hope the talk can promote discussion and cooperation in this direction.