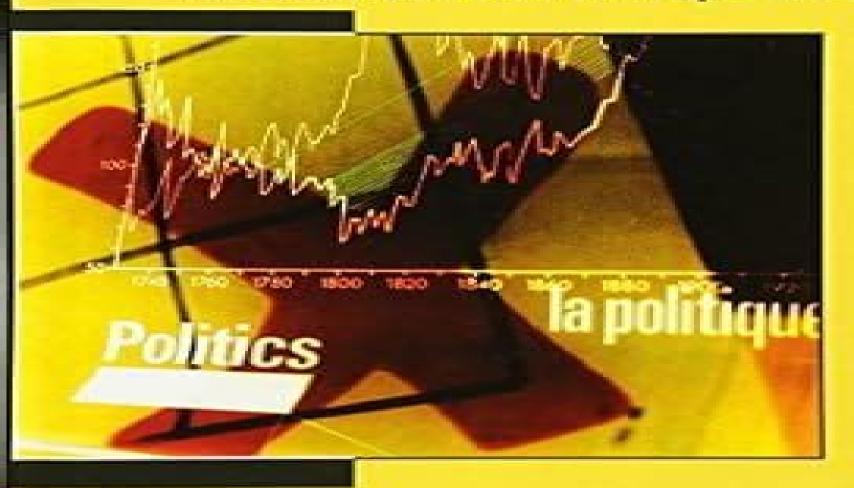
# Social Choice and the Mathematics of Manipulation



Alan D. Taylor



# **Social Choice And The Mathematics Of Manipulation**

Alan D. Taylor

#### **Social Choice And The Mathematics Of Manipulation:**

Social Choice and the Mathematics of Manipulation Alan D. Taylor,2005-05-09 Honesty in voting it turns out is not always the best policy Indeed in the early 1970s Allan Gibbard and Mark Satterthwaite building on the seminal work of Nobel laureate Kenneth Arrow proved that with three or more alternatives there is no reasonable voting system that is non manipulable voters will always have an opportunity to benefit by submitting a disingenuous ballot The ensuing decades produced a number of theorems of striking mathematical naturality that dealt with the manipulability of voting systems This 2005 book presents many of these results from the last quarter of the twentieth century especially the contributions of economists and philosophers from a mathematical point of view with many new proofs The presentation is almost completely self contained and requires no prerequisites except a willingness to follow rigorous mathematical arguments Mathematics students as well as mathematicians political scientists economists and philosophers will learn why it is impossible to devise a completely unmanipulable voting system

Social Choice and the Mathematics of Manipulation Alan D. Taylor,2005

Handbook of Computational Social Choice Felix Brandt, Vincent Conitzer, Ulle Endriss, Jérôme Lang, Ariel D. Procaccia, 2016-04-25 A comprehensive survey of computational aspects of collective decisions for graduate students researchers and professionals in computer science and economics Algorithmic Decision Theory Dimitris Fotakis, David Ríos Insua, 2021-10-27 This book constitutes the conference proceedings of the 7th International Conference on Algorithmic Decision Theory ADT 2021 held in Toulouse France in November 2021 The 27 full papers presented were carefully selected from 58 submissions. The papers focus on algorithmic decision theory broadly defined seeking to bring together researchers and practitioners coming from diverse areas of computer science economics and operations research in order to improve the theory and practice of modern decision support Cycles and Social Choice Thomas Schwartz, 2018-03-22 The centuries old paradox of voting is that majorities sometimes prefer x to y y to z and z to x a cycle The discovery of the sources and consequences of such cycles under majority rule and countless other regimes constitutes much of the mathematical theory of voting and social choice This book explores the big questions posed by the paradox of voting positive questions about how to predict outcomes and explain observed stability and normative questions about how to hold elections how to take account of preference intensities the relevance of social welfare to social choice and challenges to formal rationality individual and social The overall lesson is that cycles are facts ubiquitous and consequential in non obvious ways not puzzles to be solved much less maladies or misfortunes to be avoided or regretted **Transactions on Computational Collective** Intelligence XXIII Ngoc Thanh Nguyen, Ryszard Kowalczyk, Jacek Mercik, 2016-06-21 These transactions publish research in computer based methods of computational collective intelligence CCI and their applications in a wide range of fields such as the semantic Web social networks and multi agent systems TCCI strives to cover new methodological theoretical and practical aspects of CCI understood as the form of intelligence that emerges from the collaboration and competition of many

individuals artificial and or natural The application of multiple computational intelligence technologies such as fuzzy systems evolutionary computation neural systems consensus theory etc aims to support human and other collective intelligence and to create new forms of CCI in natural and or artificial systems This twenty third issue contains 14 carefully selected and Algorithmic Aspects of Manipulation and Anonymization in Social Choice and Social Networks revised contributions Talmon, Nimrod, 2016-05-20 This thesis presents a study of several combinatorial problems related to social choice and social networks The main concern is their computational complexity with an emphasis on their parameterized complexity The goal is to devise efficient algorithms for each of the problems studied here or to prove that under widely accepted assumptions such algorithms cannot exist The problems discussed in Chapter 3 and in Chapter 4 are about manipulating a given election where some relationships between the entities of the election are assumed This can be seen as if the election occurs on top of an underlying social network connecting the voters participating in the election or the candidates which the voters vote on The problem discussed in Chapter 3 Combinatorial Candidate Control is about manipulating an election by changing the set of candidates which the voters vote on That is there is an external agent who can add new candidates or delete existing candidates A combinatorial structure over the candidates is assumed such that whenever the external agent adds or removes a candidate a predefined set of candidates related to the chosen candidate are added or removed from the election The problem discussed in Chapter 4 Combinatorial Shift Bribery is also about manipulating an election Here however the external agent can change the way some voters vote Specifically a combinatorial structure over the voters is assumed such that the external agent can change the position of its preferred candidate in sets of voters following some predefined patterns The problem discussed in Chapter 5 Election Anonymization is also about elections The main concern here however is preserving the privacy of the voters when the votes are published along with some additional private information The task is to transform a given election such that each vote would appear at least k times By doing so even an adversary which knows how some voters vote cannot identify individual voters The problems discussed in Chapter 6 and in Chapter 7 are also about privacy Specifically a social network modeled as a graph is to become publicly available The task is to anonymize the graph that is to transform the graph such that for every vertex there will be at least k 1 other vertices with the same degree By doing so even an adversary which knows the degrees of some vertices cannot identify individual vertices In the problem discussed in Chapter 6 Degree Anonymization by Vertex Addition the way to achieve anonymity is by introducing new vertices In the problem discussed in Chapter 7 Degree Anonymization By Graph Contractions the way to achieve anonymity is by contracting as few edges as possible The main aim of this thesis considering the problems mentioned above is to explore some boundaries between tractability and intractability Specifically as most of these problems are computationally intractable that is NP hard or even hard to approximate some restricted cases and parameterizations for these problems are considered The goal is to devise efficient algorithms for them running in polynomial time when some parameters are

assumed to be constant or even better to show that the problems are fixed parameter tractable for the parameters considered If such algorithms cannot be devised then the goal is to prove that these problems are indeed not fixed parameter tractable with respect to some parameters or even better to show that the problems are NP hard even when some parameters are assumed to be constant Diese Dissertation stellt eine Untersuchung von verschiedenen kombinatorischen Problemen im Umfeld von Wahlen und sozialen Netzwerken dar Das Hauptziel ist die Analyse der Berechnungskomplexit t mit dem Schwerpunkt auf der parametrisierten Komplexit t Dabei werden frjedes der untersuchten Probleme effiziente Algorithmen entworfen oder aber gezeigt dass unter weit akzeptierten Annahmen solche Algorithmen nicht existieren k nnen Die Probleme welche im Kapitel 3 und im Kapitel 4 diskutiert werden modellieren das Manipulieren einer gegebenen Wahl bei welcher gewisse Beziehungen zwischen den Beteiligten angenommen werden Dies kann so interpretiert werden dass die Wahl innerhalb eines Sozialen Netzwerks stattfindet in dem die W hler oder die Kandidaten miteinander in Verbindung stehen Das Problem Combinatorial Candidate Control ONTROL welches in Kapitel 3 untersucht wird handelt von der Manipulation einer Wahl durch die nderung der Kandidatenmenge ber welche die W hler abstimmen Genauer gesagt gibt es einen externen Agenten welcher neue Kandidaten hinzuf gen oder existierende Kandidaten entfernen kann Es wird eine kombinatorische Struktur ber der Kandidatenmenge angenommen so dass immer wenn der externe Agent einen Kandidaten hinzuf gt oder entfernt eine vordefinierte Kandidatenmenge welche mit den ausgew hlten Kandidaten in Beziehung steht ebenfalls hinzugef gt bzw entfernt wird Das Problem Combinatorial Shift Bribery welches in Kapitel 4 untersucht wird thematisiert ebenfalls die Manipulation einer Wahl Hier allerdings kann der externe Agent nderungen des Abstimmungsverhaltens einiger W hler herbeif hren Dabei wird eine kombinatorische Struktur ber den W hlern angenommen so dass der externe Agent die Position des von ihm pr ferierten Kandidaten bei mehreren W hlern entsprechend vordefinierter Muster gleichzeitig ndern kann Das Problem Election Anonymization welches in Kapitel 5 untersucht wird befasst sich ebenso mit Wahlen Das Hauptanliegen hier ist es jedoch die Privatsph re der W hler bei der Ver ffentlichung der Stimmenabgaben zusammen mit einigen zus tzlichen privaten Informationen aufrecht zu erhalten Die Aufgabe ist es eine gegebene Wahl so zu ver ndern dass jede Stimmenabgabe mindestens k fach vorkommt Dadurch kann noch nicht einmal ein Gegenspieler einzelne W hler identifizieren wenn er die Stimmenabgaben einiger W hler bereits kennt Die in Kapitel 6 und 7 untersuchten Probleme behandeln gleicherma en Privatsph renaspekte Pr ziser gesagt geht es darum dass ein soziales Netzwerk modelliert als Graph ver ffentlicht werden soll Die Aufgabe ist es den Graphen zu anonymisieren dies bedeutet man ver ndert den Graphen so dass es frjeden Knoten mindestens k 1 weitere Knoten mit dem selben Grad gibt Dadurch wird erreicht dass selbst ein Gegenspieler welcher die Knotengrade einiger Knoten kennt nicht in der Lage ist einzelne Knoten zu identifizieren Bei dem Problem Degree Anonymization by Vertex Addition welches in Kapitel 6 untersucht wird wird Anonymit t durch Einf hrung neuer Knoten erreicht Bei dem Problem Degree Anonymization by Graph Contractions

welches in Kapitel 7 untersucht wird wird Anonymit t durch die Kontraktion von m glichst wenigen Kanten erreicht Das Hauptanliegen dieser Dissertation in Bezug auf die obig genannten Probleme ist es die Grenzen der effizienten L sbarkeit auszuloten Insbesondere da die meisten dieser Probleme berechnungsschwer genauer NP schwer bzw sogar schwer zu approximieren sind werden einige eingeschr nkte F lle und Parametrisierungen der Probleme betrachtet Das Ziel ist es effiziente Algorithmen f r sie zu entwickeln welche in Polynomzeit laufen wenn einige Parameter konstante Werte aufweisen oder besser noch zu zeigen dass die Probleme fixed parameter tractable f r die betrachteten Parameter sind Wenn solche Algorithmen nicht gefunden werden k nnen dann ist es das Ziel zu beweisen dass diese Probleme tats chlich nicht fixed parameter tractable bez glich der entsprechenden Parameter sind oder noch besser zu zeigen dass die Probleme NP schwer sind sogar wenn die entsprechenden Parameter konstante Werte aufweisen Algorithmic Decision Theory Patrice Perny, Marc Pirlot, Alexis Tsoukiàs, 2013-10-28 This book constitutes the thoroughly refereed conference proceedings of the Third International Conference on Algorithmic Decision Theory ADT 2013 held in November 2013 in Bruxelles Belgium The 33 revised full papers presented were carefully selected from more than 70 submissions covering preferences in reasoning and decision making uncertainty and robustness in decision making multi criteria decision analysis and optimization collective decision making learning and knowledge extraction for decision support **Operations Research and** Enterprise Systems Greg H. Parlier, Federico Liberatore, Marc Demange, 2018-06-28 This book constitutes revised selected papers from the 6th International Conference on Operations Research and Enterprise Systems ICORES 2017 held in Porto Portugal in February 2017 The 15 papers presented in this volume were carefully reviewed and selected from a total of 90 submissions They are organized in topical sections named methodologies and technologies and applications and Insights on Group Decision and Negotiation Bogumił Kamiński, Gregory E. Kersten, Tomasz Szapiro, 2015-06-11 This book constitutes the proceedings of the 15th International Conference on Group Decision and Negotiation GDN 2015 held in Warsaw Poland in June 2015 The GDN meetings aim to bring together researchers and practitioners from a wide spectrum of fields including economics management computer science engineering and decision science From a total of 119 submissions 32 papers were accepted for publication in this volume. The papers are organized into topical sections on group problem structuring and negotiation negotiation and group processes preference analysis and decision support formal models voting and collective decision making conflict resolution in energy and environmental management negotiation support systems and studies online collaboration and competition and market mechanisms and their users

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