Graham Wilcock

Introduction to Linguistic Annotation and Text Analytics

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SA Adler

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Introduction to Linguistic Annotation and Text Analytics Graham Wilcock,2022-05-31 Linguistic annotation and text analytics are active areas of research and development with academic conferences and industry events such as the Linguistic Annotation Workshops and the annual Text Analytics Summits This book provides a basic introduction to both fields and aims to show that good linguistic annotations are the essential foundation for good text analytics After briefly reviewing the basics of XML with practical exercises illustrating in line and stand off annotations a chapter is devoted to explaining the different levels of linguistic annotations The reader is encouraged to create example annotations using the WordFreak linguistic annotation tool The next chapter shows how annotations can be created automatically using statistical NLP tools and compares two sets of tools the OpenNLP and Stanford NLP tools The second half of the book describes different annotation formats and gives practical examples of how to interchange annotations between different formats using XSLT transformations The two main text analytics architectures GATE and UIMA are then described and compared with practical exercises showing how to configure and customize them The final chapter is an introduction to text analytics describing the main applications and functions including named entity recognition coreference resolution and information extraction with practical examples using both open source and commercial tools Copies of the example files scripts and stylesheets used in the book are available from the companion website located at the book website Table of Contents Working with XML Linguistic Annotation Using Statistical NLP Tools Annotation Interchange Annotation Architectures Text Analytics

Sentiment Analysis and Opinion Mining Bing Liu,2022-05-31 Sentiment analysis and opinion mining is the field of study that analyzes people s opinions sentiments evaluations attitudes and emotions from written language It is one of the most active research areas in natural language processing and is also widely studied in data mining Web mining and text mining In fact this research has spread outside of computer science to the management sciences and social sciences due to its importance to business and society as a whole The growing importance of sentiment analysis coincides with the growth of social media such as reviews forum discussions blogs micro blogs Twitter and social networks For the first time in human history we now have a huge volume of opinionated data recorded in digital form for analysis Sentiment analysis systems are being applied in almost every business and social domain because opinions are central to almost all human activities and are key influencers of our behaviors Our beliefs and perceptions of reality and the choices we make are largely conditioned on how others see and evaluate the world For this reason when we need to make a decision we often seek out the opinions of others This is true not only for individuals but also for organizations This book is a comprehensive introductory and survey text It covers all important topics and the latest developments in the field with over 400 references It is suitable for students researchers and practitioners who are interested in social media analysis in general and sentiment analysis in particular Lecturers can readily use it in class for courses on natural language processing social media analysis text mining and data

mining Lecture slides are also available online Table of Contents Preface Sentiment Analysis A Fascinating Problem The Problem of Sentiment Analysis Document Sentiment Classification Sentence Subjectivity and Sentiment Classification Aspect Based Sentiment Analysis Sentiment Lexicon Generation Opinion Summarization Analysis of Comparative Opinions Opinion Search and Retrieval Opinion Spam Detection Quality of Reviews Concluding Remarks Bibliography Author Biography

Bayesian Analysis in Natural Language Processing Shay Cohen,2019-04-09 Natural language processing NLP went through a profound transformation in the mid 1980s when it shifted to make heavy use of corpora and data driven techniques to analyze language Since then the use of statistical techniques in NLP has evolved in several ways One such example of evolution took place in the late 1990s or early 2000s when full fledged Bayesian machinery was introduced to NLP This Bayesian approach to NLP has come to accommodate various shortcomings in the frequentist approach and to enrich it especially in the unsupervised setting where statistical learning is done without target prediction examples In this book we cover the methods and algorithms that are needed to fluently read Bayesian learning papers in NLP and to do research in the area These methods and algorithms are partially borrowed from both machine learning and statistics and are partially developed in house in NLP We cover inference techniques such as Markov chain Monte Carlo sampling and variational inference Bayesian estimation and nonparametric modeling In response to rapid changes in the field this second edition of the book includes a new chapter on representation learning and neural networks in the Bayesian context We also cover fundamental concepts in Bayesian statistics such as prior distributions conjugacy and generative modeling Finally we review some of the fundamental modeling techniques in NLP such as grammar modeling neural networks and representation learning and their use with Bayesian analysis   Bayesian Analysis in Natural Language Processing, Second Edition Shay Cohen,2022-05-31 Natural language processing NLP went through a profound transformation in the mid 1980s when it shifted to make heavy use of corpora and data driven techniques to analyze language Since then the use of statistical techniques in NLP has evolved in several ways One such example of evolution took place in the late 1990s or early 2000s when full fledged Bayesian machinery was introduced to NLP This Bayesian approach to NLP has come to accommodate various shortcomings in the frequentist approach and to enrich it especially in the unsupervised setting where statistical learning is done without target prediction examples In this book we cover the methods and algorithms that are needed to fluently read Bayesian learning papers in NLP and to do research in the area These methods and algorithms are partially borrowed from both machine learning and statistics and are partially developed in house in NLP We cover inference techniques such as Markov chain Monte Carlo sampling and variational inference Bayesian estimation and nonparametric modeling In response to rapid changes in the field this second edition of the book includes a new chapter on representation learning and neural networks in the Bayesian context We also cover fundamental concepts in Bayesian statistics such as prior distributions conjugacy and generative modeling Finally we review some of the fundamental modeling techniques in NLP

such as grammar modeling neural networks and representation learning and their use with Bayesian analysis

Data-Intensive Text Processing with MapReduce Jimmy Lin,Chris Dyer,2022-05-31 Our world is being revolutionized by data driven methods access to large amounts of data has generated new insights and opened exciting new opportunities in commerce science and computing applications Processing the enormous quantities of data necessary for these advances requires large clusters making distributed computing paradigms more crucial than ever MapReduce is a programming model for expressing distributed computations on massive datasets and an execution framework for large scale data processing on clusters of commodity servers The programming model provides an easy to understand abstraction for designing scalable algorithms while the execution framework transparently handles many system level details ranging from scheduling to synchronization to fault tolerance This book focuses on MapReduce algorithm design with an emphasis on text processing algorithms common in natural language processing information retrieval and machine learning We introduce the notion of MapReduce design patterns which represent general reusable solutions to commonly occurring problems across a variety of problem domains This book not only intends to help the reader think in MapReduce but also discusses limitations of the programming model as well Table of Contents Introduction MapReduce Basics MapReduce Algorithm Design Inverted Indexing for Text Retrieval Graph Algorithms EM Algorithms for Text Processing Closing Remarks **Pretrained Transformers for Text Ranking** Jimmy Lin,Rodrigo Nogueira,Andrew Yates,2022-06-01 The goal of text ranking is to generate an ordered list of texts retrieved from a corpus in response to a query Although the most common formulation of text ranking is search instances of the task can also be found in many natural language processing NLP applications This book provides an overview of text ranking with neural network architectures known as transformers of which BERT Bidirectional Encoder Representations from Transformers is the best known example The combination of transformers and self supervised pretraining has been responsible for a paradigm shift in NLP information retrieval IR and beyond This book provides a synthesis of existing work as a single point of entry for practitioners who wish to gain a better understanding of how to apply transformers to text ranking problems and researchers who wish to pursue work in this area It covers a wide range of modern techniques grouped into two high level categories transformer models that perform reranking inmulti stage architectures and dense retrieval techniques that perform ranking directly Two themes pervade the book techniques for handling long documents beyond typical sentence by sentence processing in NLP and techniques for addressing the tradeoff between effectiveness i e result quality and efficiency e g query latency model and index size Although transformer architectures and pretraining techniques are recent innovations many aspects of how they are applied to text ranking are relatively well understood and represent mature techniques However there remain many open research questions and thus in addition to laying out the foundations of pretrained transformers for text ranking this book also attempts to prognosticate where the field is heading _Semantic Similarity from Natural Language and Ontology Analysis_ Sébastien Harispe,Sylvie

Ranwez,Stefan janaqi,Jacky Montmain,2022-05-31 Artificial Intelligence federates numerous scientific fields in the aim of developing machines able to assist human operators performing complex treatments most of which demand high cognitive skills e g learning or decision processes Central to this quest is to give machines the ability to estimate the likeness or similarity between things in the way human beings estimate the similarity between stimuli In this context this book focuses on semantic measures approaches designed for comparing semantic entities such as units of language e g words sentences or concepts and instances defined into knowledge bases The aim of these measures is to assess the similarity or relatedness of such semantic entities by taking into account their semantics i e their meaning intuitively the words tea and coffee which both refer to stimulating beverage will be estimated to be more semantically similar than the words toffee confection and coffee despite that the last pair has a higher syntactic similarity The two state of the art approaches for estimating and quantifying semantic similarities relatedness of semantic entities are presented in detail the first one relies on corpora analysis and is based on Natural Language Processing techniques and semantic models while the second is based on more or less formal computer readable and workable forms of knowledge such as semantic networks thesauri or ontologies Semantic measures are widely used today to compare units of language concepts instances or even resources indexed by them e g documents genes They are central elements of a large variety of Natural Language Processing applications and knowledge based treatments and have therefore naturally been subject to intensive and interdisciplinary research efforts during last decades Beyond a simple inventory and categorization of existing measures the aim of this monograph is to convey novices as well as researchers of these domains toward a better understanding of semantic similarity estimation and more generally semantic measures To this end we propose an in depth characterization of existing proposals by discussing their features the assumptions on which they are based and empirical results regarding their performance in particular applications By answering these questions and by providing a detailed discussion on the foundations of semantic measures our aim is to give the reader key knowledge required to i select the more relevant methods according to a particular usage context ii understand the challenges offered to this field of study iii distinguish room of improvements for state of the art approaches and iv stimulate creativity toward the development of new approaches In this aim several definitions theoretical and practical details as well as concrete applications are presented   Introduction to Chinese Natural Language Processing Kam-Fai Wong,Wenjie Li,Ruifeng Xu,Zheng-sheng Zhang,2022-06-01 This book introduces Chinese language processing issues and techniques to readers who already have a basic background in natural language processing NLP Since the major difference between Chinese and Western languages is at the word level the book primarily focuses on Chinese morphological analysis and introduces the concept structure and interword semantics of Chinese words The following topics are covered a general introduction to Chinese NLP Chinese characters morphemes and words and the characteristics of Chinese words that have to be considered in NLP applications Chinese word segmentation unknown word detection word meaning and Chinese linguistic

resources interword semantics based on word collocation and NLP techniques for collocation extraction Table of Contents Introduction Words in Chinese Challenges in Chinese Morphological Processing Chinese Word Segmentation Unknown Word Identification Word Meaning Chinese Collocations Automatic Chinese Collocation Extraction Appendix References Author Biographies *Linguistic Structure Prediction* Noah A. Smith,2022-05-31 A major part of natural language processing now depends on the use of text data to build linguistic analyzers We consider statistical computational approaches to modeling linguistic structure We seek to unify across many approaches and many kinds of linguistic structures Assuming a basic understanding of natural language processing and or machine learning we seek to bridge the gap between the two fields Approaches to decoding i e carrying out linguistic structure prediction and supervised and unsupervised learning of models that predict discrete structures as outputs are the focus We also survey natural language processing problems to which these methods are being applied and we address related topics in probabilistic inference optimization and experimental methodology Table of Contents Representations and Linguistic Data Decoding Making Predictions Learning Structure from Annotated Data Learning Structure from Incomplete Data Beyond Decoding Inference **Automatic Text Simplification** Horacio Saggion,2022-05-31 Thanks to the availability of texts on the Web in recent years increased knowledge and information have been made available to broader audiences However the way in which a text is written its vocabulary its syntax can be difficult to read and understand for many people especially those with poor literacy cognitive or linguistic impairment or those with limited knowledge of the language of the text Texts containing uncommon words or long and complicated sentences can be difficult to read and understand by people as well as difficult to analyze by machines Automatic text simplification is the process of transforming a text into another text which ideally conveying the same message will be easier to read and understand by a broader audience The process usually involves the replacement of difficult or unknown phrases with simpler equivalents and the transformation of long and syntactically complex sentences into shorter and less complex ones Automatic text simplification a research topic which started 20 years ago now has taken on a central role in natural language processing research not only because of the interesting challenges it posesses but also because of its social implications This book presents past and current research in text simplification exploring key issues including automatic readability assessment lexical simplification and syntactic simplification It also provides a detailed account of machine learning techniques currently used in simplification describes full systems designed for specific languages and target audiences and offers available resources for research and development together with text simplification evaluation techniques Finite-State Text Processing Kyle Gorman,Richard Sproat,2022-06-01 Weighted finite state transducers WFSTs are commonly used by engineers and computational linguists for processing and generating speech and text This book first provides a detailed introduction to this formalism It then introduces Pynini a Python library for compiling finite state grammars and for combining optimizing applying and searching finite state transducers This book illustrates this

library s conventions and use with a series of case studies These include the compilation and application of context dependent rewrite rules the construction of morphological analyzers and generators and text generation and processing applications **Recognizing Textual Entailment** Ido Dagan,Dan Roth,Fabio Zanzotto,Mark Sammons,2022-06-01 In the last few years a number of NLP researchers have developed and participated in the task of Recognizing Textual Entailment RTE This task encapsulates Natural Language Understanding capabilities within a very simple interface recognizing when the meaning of a text snippet is contained in the meaning of a second piece of text This simple abstraction of an exceedingly complex problem has broad appeal partly because it can be conceived also as a component in other NLP applications from Machine Translation to Semantic Search to Information Extraction It also avoids commitment to any specific meaning representation and reasoning framework broadening its appeal within the research community This level of abstraction also facilitates evaluation a crucial component of any technological advancement program This book explains the RTE task formulation adopted by the NLP research community and gives a clear overview of research in this area It draws out commonalities in this research detailing the intuitions behind dominant approaches and their theoretical underpinnings This book has been written with a wide audience in mind but is intended to inform all readers about the state of the art in this fascinating field to give a clear understanding of the principles underlying RTE research to date and to highlight the short and long term research goals that will advance this technology *Statistical Significance Testing for Natural Language Processing* Rotem Dror,Lotem Peled-Cohen,Segev Shlomov,Roi Reichart,2022-06-01 Data driven experimental analysis has become the main evaluation tool of Natural Language Processing NLP algorithms In fact in the last decade it has become rare to see an NLP paper particularly one that proposes a new algorithm that does not include extensive experimental analysis and the number of involved tasks datasets domains and languages is constantly growing This emphasis on empirical results highlights the role of statistical significance testing in NLP research If we as a community rely on empirical evaluation to validate our hypotheses and reveal the correct language processing mechanisms we better be sure that our results are not coincidental The goal of this book is to discuss the main aspects of statistical significance testing in NLP Our guiding assumption throughout the book is that the basic question NLP researchers and engineers deal with is whether or not one algorithm can be considered better than another one This question drivesthe field forward as it allows the constant progress of developing better technology for language processing challenges In practice researchers and engineers would like to draw the right conclusion from a limited set of experiments and this conclusion should hold for other experiments with datasets they do not have at their disposal or that they cannot perform due to limited time and resources The book hence discusses the opportunities and challenges in using statistical significance testing in NLP from the point of view of experimental comparison between two algorithms We cover topics such as choosing an appropriate significance test for the major NLP tasks dealing with the unique aspects of significance testing for non convex deep neural networks accounting for a large

number of comparisons between two NLP algorithms in a statistically valid manner multiple hypothesis testing and finally the unique challenges yielded by the nature of the data and practices of the field *Semantic Relations Between Nominals* Vivi Nastase,Stan Szpakowicz,Preslav Nakov,Diarmuid Ó Séagdha,2021-04-08 Opportunity and Curiosity find similar rocks on Mars One can generally understand this statement if one knows that Opportunity and Curiosity are instances of the class of Mars rovers and recognizes that as signalled by the word on ROCKS are located on Mars Two mental operations contribute to understanding recognize how entities concepts mentioned in a text interact and recall already known facts which often themselves consist of relations between entities concepts Concept interactions one identifies in the text can be added to the repository of known facts and aid the processing of future texts The amassed knowledge can assist many advanced language processing tasks including summarization question answering and machine translation Semantic relations are the connections we perceive between things which interact The book explores two now intertwined threads in semantic relations how they are expressed in texts and what role they play in knowledge repositories A historical perspective takes us back more than 2000 years to their beginnings and then to developments much closer to our time various attempts at producing lists of semantic relations necessary and sufficient to express the interaction between entities concepts A look at relations outside context then in general texts and then in texts in specialized domains has gradually brought new insights and led to essential adjustments in how the relations are seen At the same time datasets which encompass these phenomena have become available They started small then grew somewhat then became truly large The large resources are inevitably noisy because they are constructed automatically The available corpora to be analyzed or used to gather relational evidence have also grown and some systems now operate at the Web scale The learning of semantic relations has proceeded in parallel in adherence to supervised unsupervised or distantly supervised paradigms Detailed analyses of annotated datasets in supervised learning have granted insights useful in developing unsupervised and distantly supervised methods These in turn have contributed to the understanding of what relations are and how to find them and that has led to methods scalable to Web sized textual data The size and redundancy of information in very large corpora which at first seemed problematic have been harnessed to improve the process of relation extraction learning The newest technology deep learning supplies innovative and surprising solutions to a variety of problems in relation learning This book aims to paint a big picture and to offer interesting details **Introduction to Arabic Natural Language Processing** Nizar Y. Habash,2022-06-01 This book provides system developers and researchers in natural language processing and computational linguistics with the necessary background information for working with the Arabic language The goal is to introduce Arabic linguistic phenomena and review the state of the art in Arabic processing The book discusses Arabic script phonology orthography morphology syntax and semantics with a final chapter on machine translation issues The chapter sizes correspond more or less to what is linguistically distinctive about Arabic with morphology getting the lion s share followed by Arabic script No previous

knowledge of Arabic is needed This book is designed for computer scientists and linguists alike The focus of the book is on Modern Standard Arabic however notes on practical issues related to Arabic dialects and languages written in the Arabic script are presented in different chapters Table of Contents What is Arabic Arabic Script Arabic Phonology and Orthography Arabic Morphology Computational Morphology Tasks Arabic Syntax A Note on Arabic Semantics A Note on Arabic and Machine Translation **Automated Grammatical Error Detection for Language Learners** Claudia Leacock,Martin Chodorow,Michael Gamon,Joel Tetreault,2022-11-10 It has been estimated that over a billion people are using or learning English as a second or foreign language and the numbers are growing not only for English but for other languages as well These language learners provide a burgeoning market for tools that help identify and correct learners writing errors Unfortunately the errors targeted by typical commercial proofreading tools do not include those aspects of a second language that are hardest to learn This volume describes the types of constructions English language learners find most difficult constructions containing prepositions articles and collocations It provides an overview of the automated approaches that have been developed to identify and correct these and other classes of learner errors in a number of languages Error annotation and system evaluation are particularly important topics in grammatical error detection because there are no commonly accepted standards Chapters in the book describe the options available to researchers recommend best practices for reporting results and present annotation and evaluation schemes The final chapters explore recent innovative work that opens new directions for research It is the authors hope that this volume will contribute to the growing interest in grammatical error detection by encouraging researchers to take a closer look at the field and its many challenging problems Table of Contents Introduction History of Automated Grammatical Error Detection Special Problems of Language Learners Language Learner Data Evaluating Error Detection Systems Article and Preposition Errors Collocation Errors Different Approaches for Different Errors Annotating Learner Errors New Directions Conclusion *Cross-Language Information Retrieval* Jian-Yun Nie,2022-05-31 Search for information is no longer exclusively limited within the native language of the user but is more and more extended to other languages This gives rise to the problem of cross language information retrieval CLIR whose goal is to find relevant information written in a different language to a query In addition to the problems of monolingual information retrieval IR translation is the key problem in CLIR one should translate either the query or the documents from a language to another However this translation problem is not identical to full text machine translation MT the goal is not to produce a human readable translation but a translation suitable for finding relevant documents Specific translation methods are thus required The goal of this book is to provide a comprehensive description of the specific problems arising in CLIR the solutions proposed in this area as well as the remaining problems The book starts with a general description of the monolingual IR and CLIR problems Different classes of approaches to translation are then presented approaches using an MT system dictionary based translation and approaches based on parallel and comparable

corpora In addition the typical retrieval effectiveness using different approaches is compared It will be shown that translation approaches specifically designed for CLIR can rival and outperform high quality MT systems Finally the book offers a look into the future that draws a strong parallel between query expansion in monolingual IR and query translation in CLIR suggesting that many approaches developed in monolingual IR can be adapted to CLIR The book can be used as an introduction to CLIR Advanced readers can also find more technical details and discussions about the remaining research challenges in the future It is suitable to new researchers who intend to carry out research on CLIR Table of Contents Preface Introduction Using Manually Constructed Translation Systems and Resources for CLIR Translation Based on Parallel and Comparable Corpora Other Methods to Improve CLIR A Look into the Future Toward a Unified View of Monolingual IR and CLIR References Author Biography *Validity, Reliability, and Significance* Stefan Riezler,Michael Hagmann,2022-06-01 Empirical methods are means to answering methodological questions of empirical sciences by statistical techniques The methodological questions addressed in this book include the problems of validity reliability and significance In the case of machine learning these correspond to the questions of whether a model predicts what it purports to predict whether a model s performance is consistent across replications and whether a performance difference between two models is due to chance respectively The goal of this book is to answer these questions by concrete statistical tests that can be applied to assess validity reliability and significance of data annotation and machine learning prediction in the fields of NLP and data science Our focus is on model based empirical methods where data annotations and model predictions are treated as training data for interpretable probabilistic models from the well understood families of generalized additive models GAMs and linear mixed effects models LMEMs Based on the interpretable parameters of the trained GAMs or LMEMs the book presents model based statistical tests such as a validity test that allows detecting circular features that circumvent learning Furthermore the book discusses a reliability coefficient using variance decomposition based on random effect parameters of LMEMs Last a significance test based on the likelihood ratio of nested LMEMs trained on the performance scores of two machine learning models is shown to naturally allow the inclusion of variations in meta parameter settings into hypothesis testing and further facilitates a refined system comparison conditional on properties of input data This book can be used as an introduction to empirical methods for machine learning in general with a special focus on applications in NLP and data science The book is self contained with an appendix on the mathematical background on GAMs and LMEMs and with an accompanying webpage including R code to replicate experiments presented in the book **Metaphor** Tony Veale,Ekaterina Shutova,Beata Beigman Klebanov,2022-06-01 The literary imagination may take flight on the wings of metaphor but hard headed scientists are just as likely as doe eyed poets to reach for a metaphor when the descriptive need arises Metaphor is a pervasive aspect of every genre of text and every register of speech and is as useful for describing the inner workings of a black hole itself a metaphor as it is the affairs of the human heart The ubiquity of metaphor in natural

language thus poses a significant challenge for Natural Language Processing NLP systems and their builders who cannot afford to wait until the problems of literal language have been solved before turning their attention to figurative phenomena This book offers a comprehensive approach to the computational treatment of metaphor and its figurative brethren including simile analogy and conceptual blending that does not shy away from their important cognitive and philosophical dimensions Veale Shutova and Beigman Klebanov approach metaphor from multiple computational perspectives providing coverage of both symbolic and statistical approaches to interpretation and paraphrase generation while also considering key contributions from philosophy on what constitutes the meaning of a metaphor This book also surveys available metaphor corpora and discusses protocols for metaphor annotation Any reader with an interest in metaphor from beginning researchers to seasoned scholars will find this book to be an invaluable guide to what is a fascinating linguistic phenomenon

Natural Language Processing for Social Media Atefeh Farzindar,2022-11-10 In recent years online social networking has revolutionized interpersonal communication The newer research on language analysis in social media has been increasingly focusing on the latter s impact on our daily lives both on a personal and a professional level Natural language processing NLP is one of the most promising avenues for social media data processing It is a scientific challenge to develop powerful methods and algorithms which extract relevant information from a large volume of data coming from multiple sources and languages in various formats or in free form We discuss the challenges in analyzing social media texts in contrast with traditional documents Research methods in information extraction automatic categorization and clustering automatic summarization and indexing and statistical machine translation need to be adapted to a new kind of data This book reviews the current research on Natural Language Processing NLP tools and methods for processing the non traditional information from social media data that is available in large amounts big data and shows how innovative NLP approaches can integrate appropriate linguistic information in various fields such as social media monitoring health care business intelligence industry marketing and security and defense We review the existing evaluation metrics for NLP and social media applications and the new efforts in evaluation campaigns or shared tasks on new datasets collected from social media Such tasks are organized by the Association for Computational Linguistics such as SemEval tasks or by the National Institute of Standards and Technology via the Text REtrieval Conference TREC and the Text Analysis Conference TAC In the concluding chapter we discuss the importance of this dynamic discipline and its great potential for NLP in the coming decade in the context of changes in mobile technology cloud computing and social networking

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