From Theory to Practice: Recent Advances and Future Prospects in Computational Politeness in Natural Language Processing

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Abstract

The computational approach to politeness involves the automatic prediction and generation of politeness in text, a crucial task for conversational analysis due to the pervasiveness and complexity of politeness in interactions. This field has garnered significant interest from the conversational analysis community. This tutorial will explore the milestones in computational politeness research, covering supervised and weakly supervised feature extraction, context incorporation, politeness across social factors, and the relationship between politeness and socio-linguistic cues. We will describe the datasets, methodologies, trends, and challenges in this area, discuss performance metrics, and provide directions for future research. The tutorial offers valuable resources along dimensions like feature types, annotation techniques, datasets used, and methodologies proposed.

CCS Concepts

• **Computing methodologies** → **Natural language processing**;
• **Human-centered computing**;

Keywords

Politeness, (im)politeness, computational politeness, linguistic variations, politeness analysis

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1 Duration of the Tutorial

2 hours

2 Description & Outline

This tutorial will delve into the intersection of computational linguistics, social psychology, and artificial intelligence to understand and model politeness in digital communication. Participants will explore theoretical foundations, practical applications, and current research trends in the field. The tutorial will cover various computational methods for detecting and generating politeness and examine the role of politeness in different contexts. By the end of the tutorial, attendees will gain comprehensive insights into the methodologies, tools, and challenges involved in computational politeness research. A brief outline of this tutorial is listed below:

- **Introduction (10 minutes)**
  In the introduction to this tutorial, we will begin with an overview of the definitions of politeness from authoritative sources such as The Free Dictionary, Oxford Learner's Dictionary, and Merriam-Webster and politeness literature [4, 14, 24], emphasizing that politeness encompasses socially correct and acceptable behavior. Next, we will discuss the significance of politeness in human communication, highlighting its critical impact on social interactions and goals. Following this, we will address the relevance of politeness to AI and NLP, underscoring the necessity of emulating human politeness in human-computer interactions [10, 22]. Finally, we will provide an overview of the research scope in computational politeness, detailing the computational approaches, methodologies, and advancements in this field.
- **Politeness Theory in Linguistics (10 minutes)**
  In this part of the tutorial, we provide a concise overview of linguistic studies on politeness [4, 25, 27, 49, 50]. Politeness is pivotal in human communication, influencing the outcomes of interactions significantly [22]. These studies, central to pragmatics research in recent decades, primarily explore communicative strategies for maintaining social harmony. Various theoreticians have offered diverse definitions of politeness, shaping its understanding in scholarly discourse. Further, we will discuss factors emphasizing the role of gender, age, and culture in politeness usage in interaction [4, 6, 7, 16, 17, 19, 21, 23, 32, 33, 39, 48] and its association with other forms of social language and behavior, namely Etiquette, Formality, Emotion, and Offensiveness [2, 8, 9, 18, 20, 26, 45].
- **Computational Politeness in Natural Language Processing (60 minutes)**
  In this part of the tutorial, we will focus on two primary research categories within computational politeness: politeness as a natural language understanding task and politeness as a natural language generation task [1, 10, 34, 35, 40, 41, 43]. We will delve into how machine learning and deep learning techniques facilitate the development of computational

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models that simulate politeness-oriented interactions. Specifically, we will discuss the various problem definitions, benchmark datasets, state-of-the-art machine learning and deep learning-based methodologies, performance evaluation metrics, and recent trends central to computational politeness in NLP. Finally, we will discuss the critical issues that appear in different computational politeness works, like the acquisition of high-quality data and modeling politeness across diverse contexts [3, 11–13, 15, 29, 35, 46].

- **Relevance of Politeness for Social Good Applications (20 minutes)**
  In this section, we will delve into the role of politeness in dialogue systems for social good applications such as persuasion and mental health support. Recent studies have highlighted the benefits of integrating politeness and complementary cues like emotion and empathy into these systems [13, 15]. We will discuss some of the prominent works [36–38, 42, 43] that investigated politeness and other related cues, like emotion, sentiment, and empathy, to enhance user experience and effectiveness in social good applications, highlighting ongoing advancements and methodologies in this field.
- **Politeness and Large Language Models (10 minutes)**
  In this section, we will present the impact of Large Language Models (LLMs) like GPT-3 [5], LLaMA2 [47], and ChatGPT[1] on computational politeness. LLMs have significantly advanced NLP tasks such as emotion recognition, summarization, and dialogue generation [30, 31, 44]. We will discuss their ability to align with politeness norms and their social competence in recognizing, interpreting, and understanding politeness for effective communication. Recent studies have shown that models like ChatGPT can predict politeness reasonably well, even in zero-shot settings [28, 51]. We discuss the implications of these findings for applications in fields like healthcare and education, emphasizing the importance of LLMs adhering to social norms to foster trust and collaboration in human-machine interactions. This section aims to provide a comprehensive understanding of the role of LLMs in computational politeness and their potential to enhance human-computer interactions.
- **Conclusion and Future Directions (10 minutes)**
  Overall, in this tutorial, we will provide an overview of the extensive research conducted on computational approaches to politeness. We will review key milestones in the field, including supervised and weakly supervised feature extraction, context incorporation, and the study of politeness across various social factors such as culture, age, and gender. Besides, we will discuss the role of socio-linguistic indicators in understanding politeness. The review covers methodologies, datasets, and performance values, highlighting the increasing use of Large Language Models (LLMs) in politeness research. Despite significant advancements, challenges persist in computational politeness research, which gives direction to the future of this research arena. In particular, we will discuss the following most prominent research direction within computational politeness:
  - *Modeling Politeness Variation Across Social Factors*: Future work should focus on automatically identifying and modeling variations in politeness across different age groups, genders, and cultures. This will enhance the development of AI systems that can better understand and interact with diverse user groups.
  - *Exploring Socio-Linguistic Cues*: Research should delve deeper into the relationship between politeness and sociolinguistic cues like emotion and dialogue acts, using advanced deep learning techniques and LLMs to improve social behavior analysis in virtual assistants and human-robot interactions.
  - *Expanding to New Domains and Low-Resource Languages*: There is a need to extend politeness research beyond the English language and traditional domains like customer care to include languages such as Hindi, Bengali, Spanish and new domains like education and healthcare.
  - *Utilizing Advanced Architectures for Contextual Information*: Future studies should investigate deep learning-based architectures for extracting and utilizing contextual information, enhancing the shared knowledge required to understand politeness in various interactions.
  - *Investigating Politeness for Diverse Social Good Applications*: There is growing interest in applying politeness to social good applications such as mental health counseling, persuasion, negotiation, and education. Research in these areas can lead to more empathetic and effective communication systems, positively impacting user well-being and fostering positive social change.

[1] https://chat.openai.com/

3 Details of the previous tutorials (If any)

(1) Priyanshu Priya, Deeksha Varshney, Mauajama Firdaus, Asif Ekbal. Knowledge-enhanced Response Generation in Dialogue Systems: Current Advancements and Emerging Horizons. In LREC-COLING 2024. (Webpage: https://ainlpml-tutorials.github.io/lrec-coling24-tutorial.github.io/
(2) Priyanshu Priya, Mauajama Firdaus, Gopendra Vikram Singh, Asif Ekbal. Affective Computing for Social Good Applications: Current Advances, Gaps and Opportunities in Conversational Setting. In ECIR 2023. (URL: https://link.springer.com/chapter/10.1007/978-3-031-56069-9_50)
(3) Priyanshu Priya, Mauajam Firdaus, Kshitij Mishra, Asif Ekbal. Empathetic Conversational Artificial Intelligence Systems: Recent Advances and New Frontiers. In IJCAI 2023 (Webpage: https://ecai-tutorial-ijcai23.github.io/
(4) Priyanshu Priya, Mauajama Firdaus, Gopendra Vikram Singh, Asif Ekbal. Navigating the Landscape of Empathetic Dialogue Systems: Current Innovations and Future Developments. In ICON 2023 (Webpage: https://icon23-tutorial.github.io/
(5) Muthusamy Chelliah, Asif Ekbal, Mohit Gupta. Concept to Code: Aspect Sentiment Classification with Deep Learning. In IJCAI 2019.

4 Goals

The primary objectives of this tutorial are to delve into the intersection of computational linguistics, social psychology, and artificial

intelligence to understand and model politeness in digital communication. Participants will gain an understanding of the theoretical foundations of politeness in communication, explore practical applications, and examine current research trends in computational politeness. The tutorial aims to cover various computational methods for detecting and generating politeness, highlighting their role in different contexts.

The attendees of this tutorial will benefit in several significant ways. They will gain comprehensive insights into the methodologies, tools, and challenges involved in computational politeness research, helping them stay abreast of the latest advancements in the field. The tutorial will enhance participants' practical skills in implementing computational models for politeness detection and generation, providing them with valuable hands-on experience. Furthermore, attendees will gain a deeper understanding of the interdisciplinary integration of politeness in AI and NLP, incorporating insights from social psychology. We believe that this tutorial aligns with the conference themes of machine learning and artificial intelligence, particularly in enhancing human-computer interaction through the integration of politeness.

5 Target Audience

We anticipate that our target audience will include students at all academic levels (Doctoral, Master's, and Bachelor's), professionals in healthcare and customer care, and individuals involved in related application areas, as well as researchers in the field. We assume that participants will have a fundamental understanding of chatbots and neural networks, typically covered in introductory courses on Machine Learning (ML), Deep Learning (DL), and Natural Language Processing (NLP). We expect an audience of approximately 25-30 participants.

6 Proposers

(1) Priyanshu Priya, Indian Institute of Technology Patna, India (Email Id: priyanshu_2021cs26@iitp.ac.in; priyanshu528priya@gmail.com; LinkedIn)
Bio: Priyanshu Priya is a Research Scholar with the Department of Computer Science and Engineering, Indian Institute of Technology (IIT) Patna, India. Her research interests include natural language processing with a focus on politeness and empathy in conversations. Priyanshu has published several journal and conference papers in reputed forms, such as Expert Systems With Applications, ACM Computing Surveys, LREC, AAAI, IJCAI, ACL, IJCNLP-AACL, EMNLP, NAACL.

(2) Mauajama Firdaus, Indian Institute of Technology (Indian School of Mines), Dhanbad, India (Email Id: mauzama.03@gmail.com; LinkedIn)
Bio: Mauajama Firdaus is an Assistant Professor at the Indian Institute of Technology (Indian School of Mines), Dhanbad, India. She did her PostDoc from the University of Alberta, Canada, and Ph.D. from IIT Patna in 2021. Her main area of research is Natural Language Processing and Dialogue Generation. She has published papers in various peer-reviewed conferences and journals of international repute and has been a reviewer for top-tier conferences like AAAI, IJCAI, EMNLP, etc.

(3) Asif Ekbal, Indian Institute of Technology Jodhpur, Jodhpur, India. (Email Id: asif.ekabl@gmail.com, LinkedIn).
Bio: Asif Ekbal is currently a Professor in the School of Artificial Intelligence and Data Science, Indian Institute of Technology Jodhpur, Rajasthan (on lien as Associate Professor, Department of CSE, IIT Patna). He has been pursuing research in NLP, Information Extraction, Text Mining, and ML applications for the last 20 years. He has authored around 300 papers in top-tier conferences (AAAI, IJCAI, ACL, EMNLP, etc.) and journals (Computational Linguistics, Natural Language Engineering, IEEE Transaction on Affective Computing etc.) Asif has been involved in several sponsored research projects funded by different private agencies (Elsevier, Accenture, Samsung, Flipkart); and Govt. agencies (MeiTY, Govt. of India, MHRD, Govt. of India, and SERB, Govt. of India etc.). He has presented tutorials in IJCAI 2023 (Conversational AI), IJCAI 2019 (Sentiment Analysis) and in Flipkart Data Science Conference (Machine Translation, and has delivered around 60 invited talks in conferences, workshops, summer schools, and in Industries, such as Accenture, Microsoft, Huawei, Wipro etc. He is an awardee of the "Best Innovative Project Award from the Indian National Academy of Engineering", Govt. of India, "JSPS Invitation Fellowship" from Govt of Japan and "Visvesvaraya Young Faculty Research Fellowship Award" of the Govt. of India. He is listed as top-2% scientists, published by Stanford and in top CS researchers, published by Openresearch.com. Google Scholar Citation which is the benchmark for Computer Science and Engineering shows 11054 career citations to Dr. Asif's papers, with h-index: 52 and i-10 index: 250.

7 Presenters

(1) Priyanshu Priya, Indian Institute of Technology Patna, India (Email Id: priyanshu_2021cs26@iitp.ac.in; priyanshu528priya@gmail.com; LinkedIn)
(2) Mauajama Firdaus, University of Alberta, Canada (Email Id: mauzama.03@gmail.com; LinkedIn)
(3) Asif Ekbal, Indian Institute of Technology Patna, India. (Email Id: asif.ekabl@gmail.com, LinkedIn).

8 Relevant publications from research group

(1) Priyanshu Priya, Gopendra Singh, Mauajama Firdaus, Jyotsna Agrawal, Asif Ekbal (2024) *On the Way to Gentle AI Counselor*: Politeness Cause Elicitation and Intensity Tagging in Code-mixed Hinglish Conversations for Social Good. In Findings of the Association for Computational Linguistics: NAACL 2024.
(2) Mauajama Firdaus, Priyanshu Priya, Asif Ekbal. Mixing It Up: Inducing Empathy and Politeness using Multiple Behaviour-aware Generators for Conversational Systems. In Findings AACL-IJCNLP 2023.
(3) Kshitij Mishra, Priyanshu Priya, Asif Ekbal (2023). PAL to Lend a Helping Hand: Towards Building an Emotion Adaptive Polite and Empathetic Counseling Conversational Agent.

In Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics, Canada Toronto.
(4) Priyanshu Priya, Kshitij Mishra, Asif Ekbal (2023). PARTNER: A Persuasive Mental Health and Legal Counselling Dialogue System for Women and Children Crime Victims. In the 32nd International Joint Conference on Artificial Intelligence (AI for Social Good Track), Macao, S.A.R.
(5) Kshitij Mishra, Priyanshu Priya, Asif Ekbal (2023). *Help Me Heal*: A Reinforced Polite and Empathetic Mental Health and Legal Counseling Dialogue System for Crime Victims. In 37th AAAI Conference on Artificial Intelligence, February 7-14, USA.
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(7) K. Mishra, M. Firdaus, A. Ekbal (2023). GenPADS: Reinforcing politeness in an end-to-end dialogue system. PLoS One, https://doi.org/10.1371/journal.pone.0278323
(8) M. Firdaus, A. Ekbal, P. Bhattacharyya (2022). PoliSe: Reinforcing Politeness using User Sentiment for Customer Care Response Generation. In 29th International Conference on Computational Linguistics (COLING), October 12-17, Korea.
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(10) A. Samad, K. Mishra, M. Firdaus, A. Ekbal (2022). Empathetic Persuasion: Reinforcing Empathy and Persuasiveness in Dialogue Systems. In Proceedings of NAACL-HLT 2022 (Findings), 844-856, July 10-15, USA.
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(14) M. Firdaus, U. Jain, A. Ekbal, P. Bhattacharyya (2021). SEPRG: Sentiment aware Emotion controlled Personalized Response Generation. In Proc. of the 14th International Conference on Natural Language Generation (INLG), 353-363.
(15) Mauajama Firdaus, Hitesh Golchha, Asif Ekbal, Pushpak Bhattacharyya (2021). A Deep Multi-task Model for Dialogue Act Classification, Intent Detection and Slot Filling. Cognitive Computation 13(3): 626-645 (2021).
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