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Polysemy of Terms in Computational Linguistics

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Abstract

This article examines polysemy in computational linguistics, highlighting the challenges and opportunities it presents. Polysemy, where a word has multiple meanings, is central to natural language processing and reflects the richness of human communication. The paper explores various aspects of polysemy, including Word Sense Disambiguation (WSD), semantic networks, and the impact of language evolution. It references key works by Polshchykova on terminology consistency and by Haber and Poesio on the interdisciplinary nature of polysemy research. The study emphasizes the importance of understanding the nuanced meanings of polysemous words and the role of context in their interpretation. It also discusses the significance of standardizing terminology and the implications of polysemy in professional communication within computational linguistics. The article concludes that addressing polysemy requires sophisticated computational approaches and interdisciplinary collaboration to enhance clarity and understanding in the field.

Keywords: Polysemy; computational linguistics; word sense disambiguation (wsd); semantic networks; natural language processing (nlp); terminology standardization; hyper-hyponymic relations; language evolution.

Introduction

In the evolving field of computational linguistics, the phenomenon of polysemy – the existence of multiple meanings for a single word or term – presents both challenges and opportunities. As computational systems increasingly interact with human language, understanding and accurately interpreting the nuanced meanings of words becomes crucial. This article delves into the polysemy of computational linguistics terms, exploring how this linguistic feature impacts the field from various perspectives.

Polysemy, the phenomenon where a single word holds multiple meanings, stands as a significant and intriguing concept in computer linguistics (Dalieva, 2023a). This aspect of language, central to natural language processing (NLP), reveals the complexity and richness of human communication. Understanding and accurately interpreting polysemous words demands a nuanced analysis of context. For instance, a word like “bank” can signify a financial institution or the side of a river, depending on its usage. This contextual dependency underscores the importance of contextual analysis in computational models, as highlighted by Polshchykova (2023) in her work on the terminology consistency of computational linguistics.

Addressing polysemy effectively requires sophisticated approaches, such as Word Sense Disambiguation (WSD), a challenging yet critical task in NLP for determining the intended meaning of a word within a specific context. As Haber and Poesio (2023) note, the study of polysemy intersects with insights from linguistics, behavioural science, and contextualised language models. These models, often built on machine learning and deep learning technologies, are trained on extensive datasets, enabling them to detect patterns and infer meanings based on context.

The handling of polysemy also involves semantic networks or ontologies, where words are linked to different meanings and related concepts (Dalieva, 2023b). This approach aids in understanding the relationships between various senses of a word. The dynamic nature of language, where words evolve and acquire new meanings over time, adds to the complexity of polysemy in computational linguistics. David Crystal's "The Cambridge Encyclopedia of Language" (1997) provides a foundational understanding of these linguistic phenomena, highlighting how language's evolution continually presents new challenges for computational models. Polysemy, in the context of computer linguistics, has been approached from various perspectives by different scientists and researchers, reflecting the complexity and multidisciplinary nature of the topic.

Janosch Haber and Massimo Poesio, in their study published in the MIT Press journal Computational Linguistics, emphasize the interdisciplinary nature of polysemy research, which spans linguistics, psychology, neuroscience, and computational linguistics. Their work highlights the complexity of polysemy and the challenges it poses, particularly regarding the representation and processing of polysemous words. They note that traditional analyses of polysemy can be limited in their generalizability due to loose definitions and selective materials. They advocate for hybrid models of mental processing of polysemes, combining different theoretical approaches to explain the patterns and idiosyncrasies in the processing of polysemous sense extensions (Haber & Poesio, 2023).

The research conducted by Polshchykova (2022a) on hyper-hyponymic relations in computer linguistics terminology provides significant insights that are directly relevant to understanding and addressing the polysemy of terms within this field. By exploring the structural organization of terminology and introducing a novel classification of gender-aspect relations, the study sheds light on the complex semantic relationships and hierarchical structures inherent in computer linguistics. These structures are crucial for deciphering the varied meanings of polysemous terms, as they highlight the nuanced differences in semantic features that terms may exhibit based on their context within the terminological hierarchy.

The identification of hyper-hyponymic relationships, where terms are organized based on their broader (hyperonyms) and more specific (hyponyms) meanings, is particularly relevant in the context of polysemy Polshchykova (2022a). This organization helps in understanding how a single term can possess multiple meanings, which vary in specificity and context. The clarity brought about by this hierarchical structuring is essential for interpreting polysemous terms correctly, enabling professionals in the field to distinguish between their different uses and meanings.

Furthermore, the standardization of terminology, a key outcome of this study, plays a vital role in mitigating the challenges posed by polysemy. By promoting the use of specific terms for distinct concepts, the ambiguity and multiplicity of meanings that characterize polysemous terms are significantly reduced. In this way, Polshchykova's research not only contributes to the structural

and semantic understanding of computer linguistics terminology but also provides a foundation for more effective communication and knowledge dissemination within the field, directly addressing the inherent challenges of polysemy (Polshchykova, 2022b).

In the field of computer linguistics, polysemy refers to the phenomenon where a single term can have multiple meanings. This multiplicity of meanings can occur due to various reasons. One of the key reasons is the dynamic nature of technology and language, where new concepts frequently emerge, necessitating the adoption or creation of new terms. Sometimes, existing terms are repurposed or extended to cover new concepts, leading to polysemy (Polshchykova, 2022b). Moreover, the interdisciplinary nature of computer linguistics often borrows terms from different fields, further contributing to polysemy. For instance, a term used in computer linguistics might also have distinct meanings in fields like physics or general language, thus exhibiting explicit polysemy. Another aspect of polysemy in computer linguistics is its categorial nature, where a term can belong to multiple categories simultaneously, reflecting different facets of a concept. The study of polysemy in computer linguistics is essential for standardizing terminology and enhancing clarity in professional communication within the field.

The exploration of polysemy within computational linguistics reveals a multifaceted phenomenon that significantly impacts the field. Polysemy, characterized by a single term's ability to possess multiple meanings, reflects the dynamic and evolving nature of both language and technology. This complexity necessitates advanced computational approaches, such as Word Sense Disambiguation and semantic network modeling, to accurately interpret and utilize these polysemous terms. As language continues to evolve, so too must the computational models and strategies that aim to comprehend and utilize its complexities effectively.

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