

Text Mining Analysis and Concept Mapping of 60 Philosophical Texts: Perceiving the Purpose of Education from Ancient Greece to Postmodern Era

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Abstract

The philosophical discourse on the purpose of education has transformed through various epochs, from the paideia of Ancient Greece to contemporary postmodern critiques. This study utilizes machine learning techniques, including natural language processing and sentiment analysis, to dissect and interpret the evolution of educational philosophy across 60 key Western philosophical texts. By employing methods like Latent Dirichlet Allocation (LDA), knowledge inference, concept mapping, and sentiment analysis, we investigate how philosophers from different historical periods have conceptualized the role, methods, and outcomes of education. Our research questions focus on identifying thematic shifts, emotional tones, and the interconnections between philosophical schools of thought regarding education. We analyze texts from a diverse dataset spanning from Plato to postmodern theorists like Foucault and Lyotard. This methodological approach, distinct from traditional hermeneutics, allows for the discovery of patterns and relationships that might be obscured in manual analyses due to human cognitive limitations. Key findings include the identification of dominant themes in various eras, such as ethics and human nature in the Ancient period, shifting to science, language, and socio-economic considerations in the Modern era. We also present insights into how these themes and their associated sentiments evolve, offering a nuanced understanding of educational philosophy's trajectory. This research not only contributes to the philosophy of education by providing a data-driven historical analysis but also has practical implications for modern educational policy, offering a historical lens through which to view current educational reforms. By integrating computational methods with philosophical inquiry, we chart a novel path that could influence both academic study and educational practice, highlighting enduring educational concepts and those that have transformed over time.

Keywords

Philosophy of education, text mining, concept mapping, text analysis, knowledge inference, sentiment analysis

1. INTRODUCTION

The question of education's purpose has been a central philosophical inquiry spanning over two millennia, evolving from the Ancient Greek conception of *paideia* to the contemporary postmodern critiques of educational institutions. This research employs machine learning techniques to analyze 60 philosophical texts, tracing the shifts of educational philosophy across distinct historical periods. By using natural language processing and sentiment analysis, this study aims to uncover patterns in how Western philosophers conceived the fundamental purpose of education.

Previous scholarly work in this domain has primarily relied on traditional hermeneutic approaches, focusing on close readings and comparative analysis of individual texts. While these methods have provided valuable insights, they have been limited by the constraints of human processing capacity and potential subjective biases. Notable works such as Werner Jaeger's "Paideia: The Ideals of Greek Culture" (1939) and Richard Rorty's "Education as Socialization and as Individualization" (1989) have established frameworks for understanding this evolution, but have not benefited from the analytical possibilities offered by contemporary computational methods.

The present study bridges this methodological gap by applying advanced machine learning algorithms to a carefully curated corpus of philosophical texts. This corpus spans from Plato's "Republic" and Aristotle's "Politics" through medieval scholastic works, Enlightenment treatises, and modern educational philosophies, ended in postmodern critiques by theorists such as Michel Foucault and Jean-François Lyotard. By employing topic modeling, semantic analysis, and temporal pattern recognition, this research seeks to identify key transitions, recurring themes, and paradigm shifts in educational philosophy.

The significance of this research lies in its potential to reveal previously unrecognized patterns in how educational purpose has been conceptualized across different historical periods. Understanding these patterns is crucial for contemporary educational policy and practice, as it provides historical context for current debates about educational reform and helps identify which educational purposes have remained constant across time and which have undergone substantial transformation.

The research draws upon an interdisciplinary framework, incorporating insights from philosophy of education, intellectual history, computational linguistics, and data science. This combination of methodologies enables a novel approach to understanding how the purpose of education has been conceptualized and reconceptualized throughout Western intellectual history.

Through this analysis, we expect to identify key inflection points in educational philosophy, trace the evolution of central concepts, and map the complex network of influences that have shaped our understanding of education's purpose.

2. RESEARCH METHODOLOGY

2.1. Primary Research Questions:

How have philosophical themes and their emotional tones evolved over time, and what interconnections exist between different schools of thought and their conceptualizations of education?

Approach: Utilize a combination of **text analysis**, **topic modeling**, and **sentiment analysis** to identify dominant themes and emotional tones in philosophical works across different eras. Employ **association rule mining** to explore relationships between philosophical schools and their influence on educational philosophies. Construct **knowledge graphs** and **concept maps** to visualize semantic interconnections and thematic evolution, revealing insights into the progression and interrelation of philosophical ideas.

2.1.1. Research Question #1

What insights can we draw regarding the trends in philosophical topics over time?

Approach: Use **text analysis** and **topic modeling (e.g., LDA)** to identify dominant themes in philosophical works across different time periods. By clustering similar themes, we can analyze shifts in popular philosophical ideas and see how certain themes emerge, evolve, or fade over centuries. Visualization tools like time-series graphs can highlight trends over time.

2.1.2. Research Question #2

What inferred knowledge or insights can be derived about philosophical evolution based on overlapping themes among influential works?

Approach: Use **knowledge inference** techniques to analyze co-occurrences of authors' references and shared themes in philosophical texts. Knowledge inference focuses on deducing hidden patterns and relationships within the data. In this case, we infer intellectual and thematic influences by identifying when one author references another or shares overlapping keywords, constructing knowledge graphs to visualize these connections and reveal the evolution of philosophical ideas over time.

2.1.3. Research Question #3

How do different philosophers from various schools of thought conceptualize the purpose, methods, and outcomes of education?

Approach: Analyze texts from philosophers by extracting and examining educational themes, focusing on terms related to knowledge and teaching. Group and compare these themes across different authors and schools of thought to identify patterns and differences. This method reveals how educational philosophies are articulated and how they vary or align across historical and cultural contexts.

2.1.4. Research Question #4

What themes and emotional tones emerge from the analysis of philosophical texts?

Approach: Utilize **vector embeddings** to capture semantic information from philosophical texts, applying **t-SNE** for dimensionality reduction to visualize relationships. Use **KMeans clustering** to identify thematic groupings and TextBlob for **sentiment analysis** to assess emotional tones. This method reveals patterns in how philosophical ideas are organized and their associated sentiments, providing insights into the emotional undercurrents of educational philosophies.

2.2. Data Source

Data Source: History of Philosophy Dataset

(<https://www.kaggle.com/datasets/kouroshalizadeh/history-of-philosophy>)

The "History of Philosophy" dataset, available on Kaggle, is a collection designed for the Philosophy Data Project. It serves as a bridge between the fields of philosophy and data science, aiming to apply analytical tools to the study of philosophical texts.

The dataset was initially created to build a classification model that could analyze philosophical texts based on their conceptual frameworks. Unlike traditional sentiment analysis, this project focuses on ideological analysis, seeking to classify texts according to the worldviews they embody. Understanding these worldviews has broad applications, from targeted advertising and political campaigning to self-exploration and therapy.

This dataset contains over 300,000 sentences from more than 60 philosophical texts, spanning ten major schools of thought: Plato, Aristotle, Rationalism, Empiricism, German Idealism, Communism, Capitalism, Phenomenology, Continental Philosophy, and Analytic Philosophy. The texts were sourced from Project Gutenberg and the compiler's personal library, ensuring a diverse and comprehensive collection. Extensive cleaning and tokenization were performed on the texts, with detailed procedures documented in the project's GitHub repository.

Availability and Community Engagement:

The dataset is periodically updated as new texts are added, and it has been made publicly available to encourage further research and innovation. The Philosophy Data Project invites users to share their findings, offering to feature notable projects on its website. This dataset not only serves as a tool for academic inquiry but also inspires creative projects that can reveal new insights into the history and impact of philosophical thought.

2.3. EDM Methods

2.3.1. Latent Dirichlet Allocation (LDA)

Latent Dirichlet Allocation (LDA) is a widely used topic modeling algorithm that represents documents as a mixture of latent topics, where each topic is characterized by a distribution over words. The LDA algorithm assumes that each document in a corpus is generated from a mixture of latent topics, and each topic is represented by a multinomial distribution over the vocabulary (Ogunwale, 2023; Habich et al., 2007).

The LDA algorithm has been applied to various domains, such as topic extraction for research paper abstracts, analysis of news articles, and identification of consumer characteristics and market trends from social media data (Koga & Taniguchi, 2011; Iqbal et al., 2018). LDA has also been extended to handle non-textual data, such as images, by creating a bag-of-words representation of the image features. Overall, the LDA algorithm has proven to be a versatile and powerful tool for discovering latent semantic structures in large text corpora (Giroilami & Kabán, 2003).

2.3.2. Knowledge Inference

Automated reasoning is a powerful technique in artificial intelligence that enables knowledge inference based on domain knowledge and multiple data sources. In the biomedical domain, the capabilities of reasoning have been demonstrated in the synthesis of pharmacokinetic pathways and the identification of drug-drug interactions. Furthermore, automated reasoning has been applied to identify novel drug indications for existing drugs, showcasing its potential in the drug development process (Tari et al., 2012).

The problem of language variability is at the heart of many semantic applications, such as information extraction, question answering, and semantic parsing. Consequently, learning broad coverage knowledge bases of entailment rules and paraphrases has proved crucial for systems that perform inference over textual representations (Berant et al., 2015). Recent research has also explored the use of information-guided temporal logic inference with prior knowledge to infer interpretable and informative knowledge from data (Xu et al., 2019). Additionally, explainable knowledge graph embedding has been proposed to support robot actions by reconciling knowledge inferences and providing explanations to non-expert.

2.3.3. Concept Mapping

Concept mapping is a powerful teaching and learning strategy that can be used to evaluate a student's critical thinking skills. This graphical tool helps students visualize the meaningful relationships between different concepts, promoting deeper understanding and knowledge retention. Concept mapping has been widely applied in education, where it has been shown to enhance students' critical thinking, academic success, and nursing competence. By constructing concept maps, students can organize their knowledge, identify gaps, and develop a more holistic understanding of the subject matter (George et al., 2014).

2.3.4.Sentiment Analysis

Sentiment analysis is a computational technique used to identify and classify the sentiment or emotional tone expressed in textual data, such as social media posts, product reviews, and customer feedback. Researchers have explored both traditional machine learning methods and deep learning models for sentiment analysis, with the latter showing exceptional performance in tasks like tweet sentiment classification. Sentiment analysis can provide valuable insights into customer perceptions, public opinion, and emerging trends, enabling organizations to make more informed decisions (Broek-Altenburg & Atherly, 2019).

3. RESULTS OR FINDINGS

3.1. Results of Research Question #1

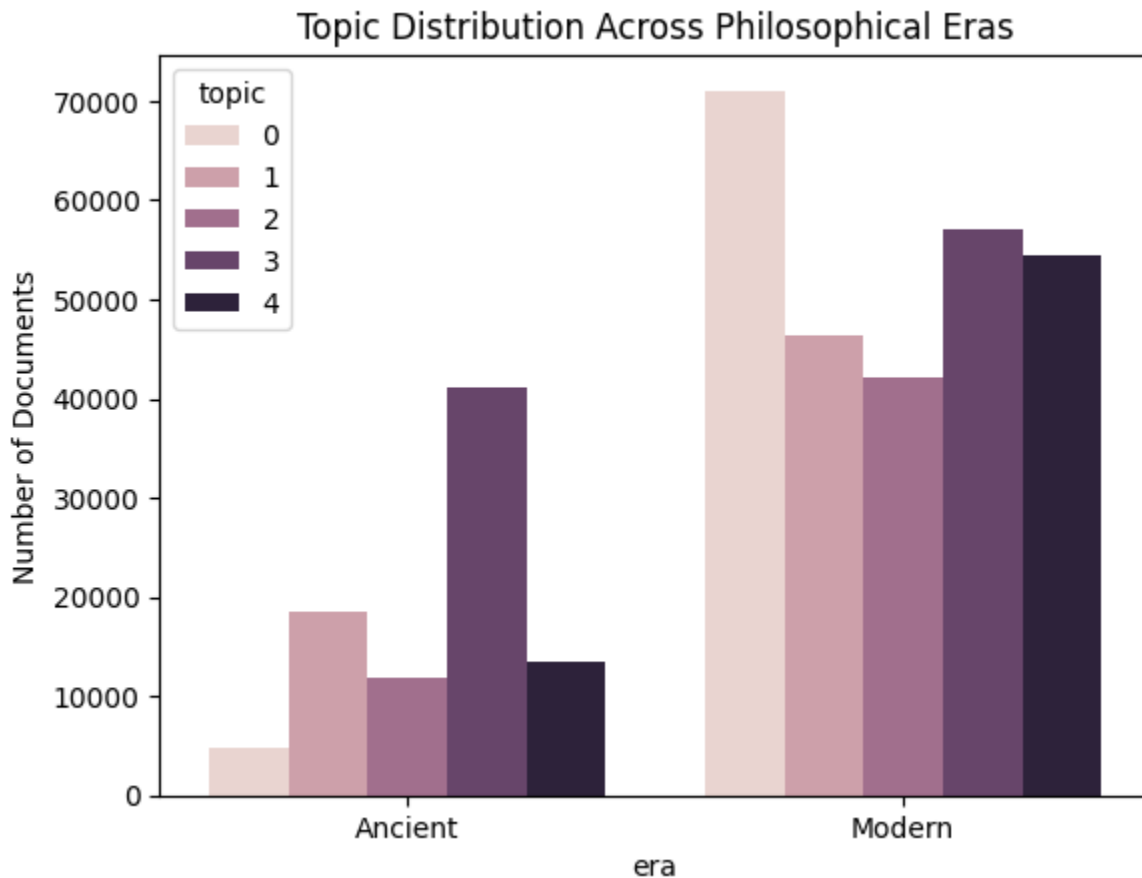
Topic #0: world point language truth time possible meaning way science sense

Topic #1: things different true thing ideas does case say motion number

Topic #2: object body consciousness self reason existence animals form concept movement

Topic #3: man good things say men think reason god know said

Topic #4: labor great women woman capital time value price state water



From the given image and text description, there are several insights we can draw regarding the trends in philosophical topics over time:

1. Dominance of Topics by Era:

In the Ancient era, Topic 3 ("man, good, things, reason, god") seems to have a significant presence. This indicates a strong focus on discussions around morality, human nature, and theology.

In the Modern era, Topic 0 ("world, point, language, truth, time") has the highest number of documents. This suggests a shift towards questions about language, science, and the understanding of truth, which are typical of modern philosophical concerns.

2. Shift in Focus

The Ancient era shows significant representation in topics related to human behavior, ethics, and metaphysics (Topic 3).

The Modern era shows a major shift to more diverse topics, including language, science, and value systems. This could reflect the influence of scientific advancements and social changes in the modern period.

3. Comparison of Topics Across Eras

Topic 0 (related to language, truth, and science) has grown considerably in the Modern era, suggesting a growing emphasis on empirical understanding and scientific inquiry.

Topic 4 (related to economics, labor, capital, and value) is also significant in the Modern era, indicating the impact of economic theories and social changes that were less present in Ancient times.

Topic 1 and Topic 2 have some presence across both eras, implying continuity in philosophical discussions about abstract ideas and the nature of reality.

4. Philosophical Ideas Over Time

The trend indicates that Ancient philosophy was more centered on existential questions, ethics, and the nature of human beings.

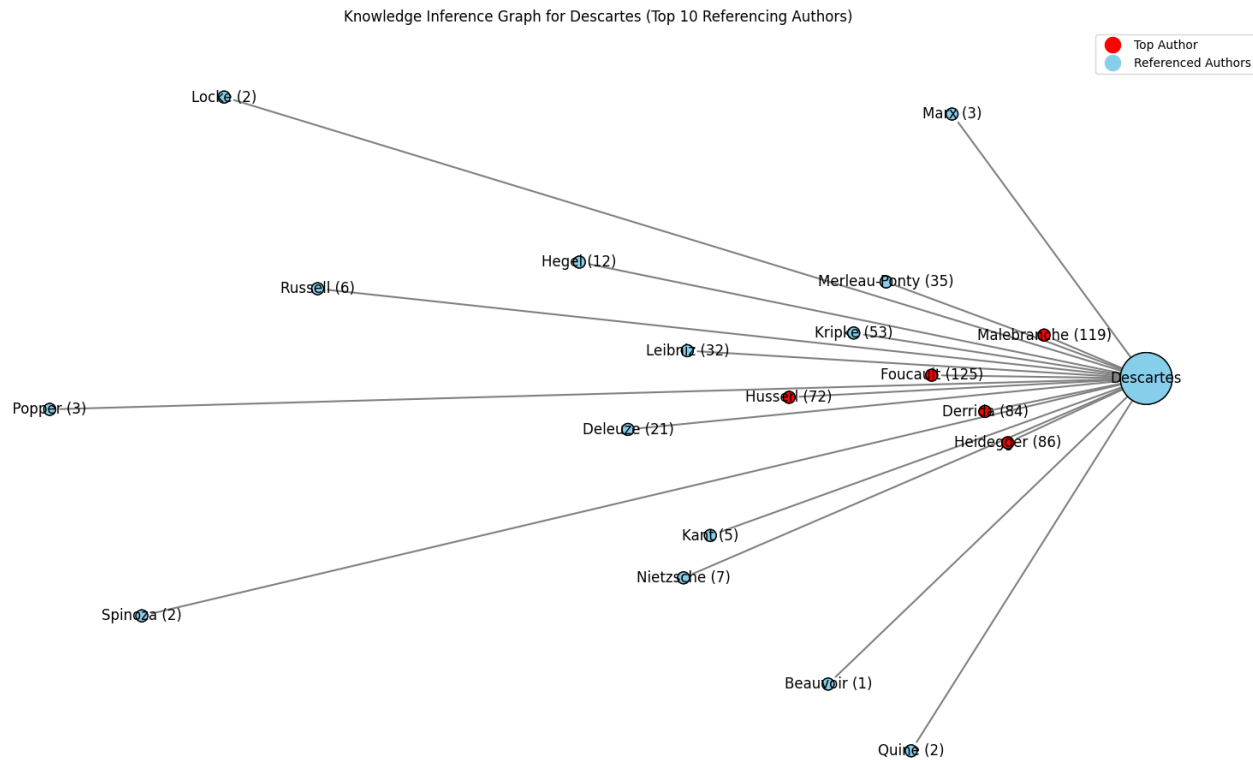
Modern philosophy diversified into understanding language, scientific reasoning, and socio-economic topics. This reflects how philosophical interests have expanded and adapted in response to societal and intellectual progress.

- Ancient Era: Focus on ethics, metaphysics, human nature, and religion.
- Modern Era: Shift towards science, empirical truth, language, and socio-economic issues.

To sum up, this analysis shows a clear trend of philosophical evolution from fundamental human questions to more abstract, systemic, and socially-oriented discussions, likely influenced by historical events like the Enlightenment, Industrial Revolution, and the rise of social sciences.

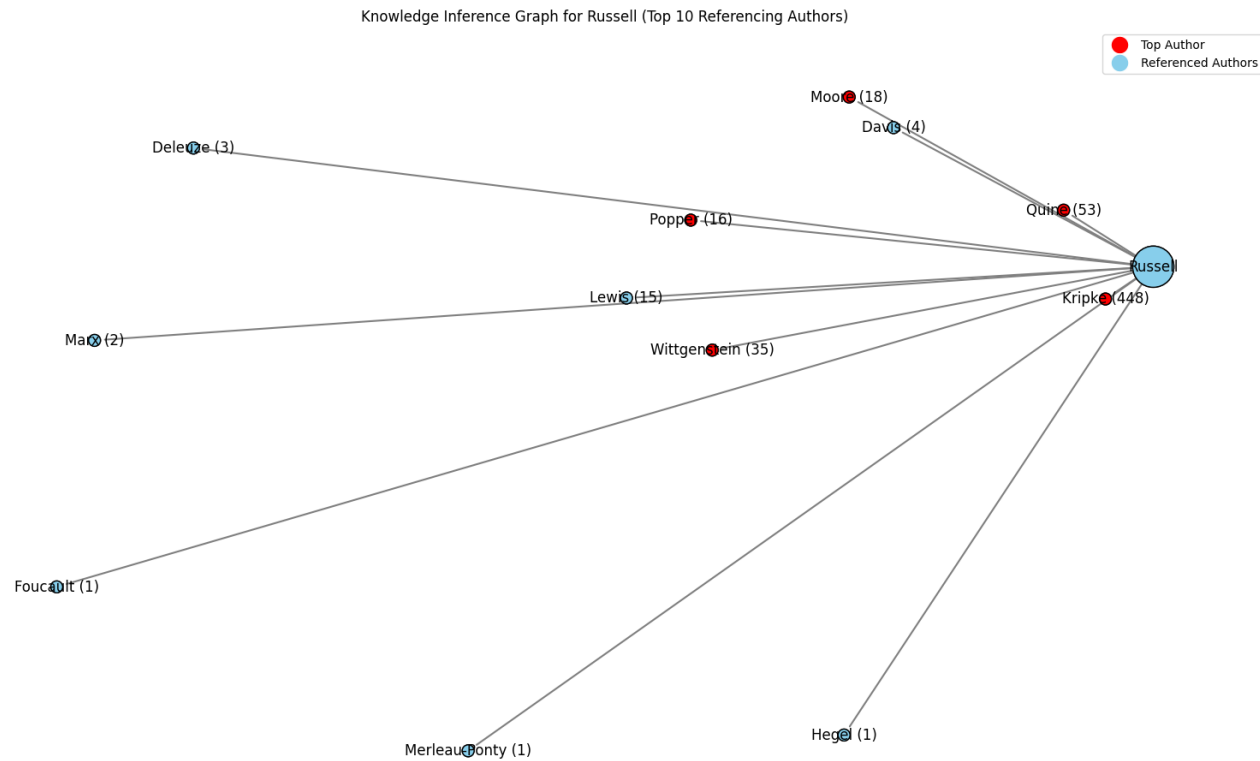
3.2. Results of Research Question #2

The first 5 great man got most mentioned by the author are 'Descartes', 'Russell', 'Kant', 'Aristotle', 'Plato', 'Hegel', 'Smith', 'Nietzsche', 'Hume', and 'Marx'.



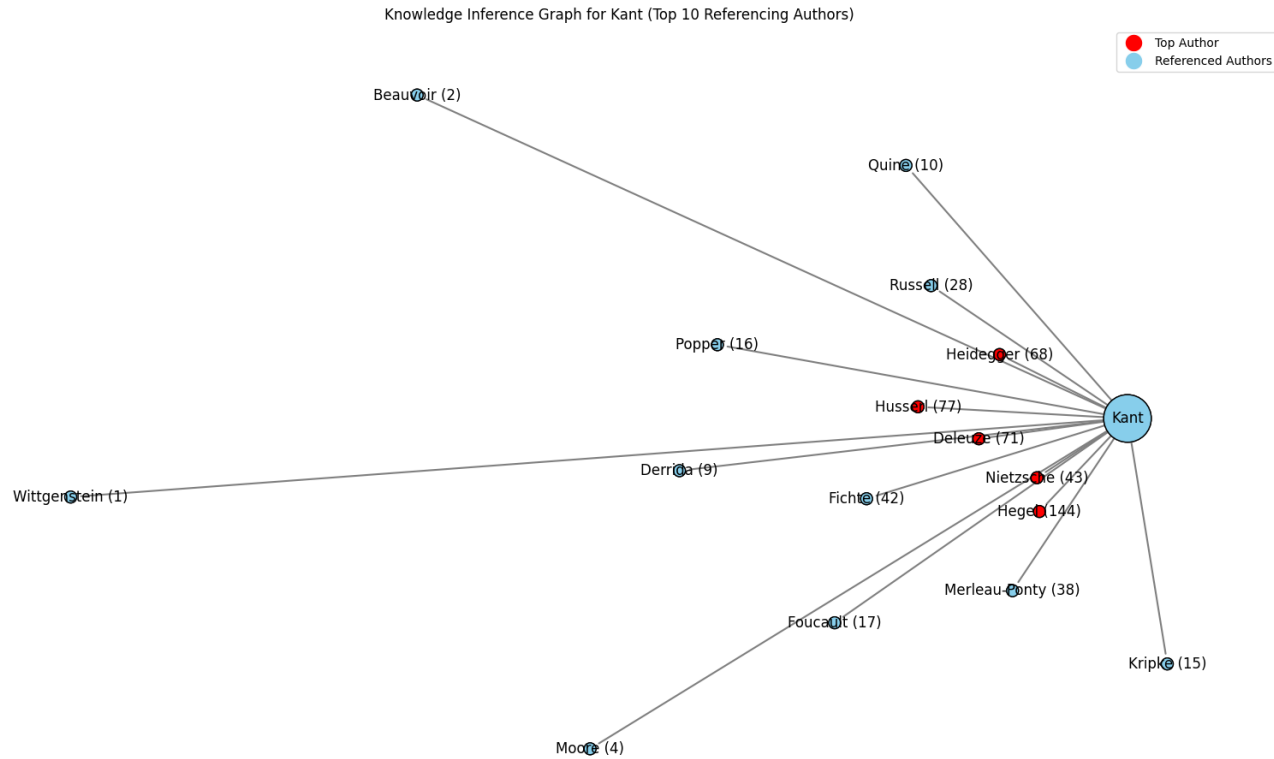
The graph highlights Descartes' central influence in philosophy, showing frequent references by key figures like Foucault (125), Malebranche (119), and Heidegger (86). His ideas bridge early modern philosophy and contemporary discussions, impacting diverse fields such as phenomenology (Husserl), analytic philosophy (Kripke), and existentialism (Heidegger).

Less frequent but notable references (e.g., Spinoza, Popper, Beauvoir) reveal the broad reach of Descartes' work across different domains. Themes like methodological skepticism, knowledge, and existence emerge as key areas of influence, illustrating the enduring and cross-disciplinary relevance of his ideas. This interconnectedness showcases Descartes as a foundational figure shaping centuries of intellectual thought.



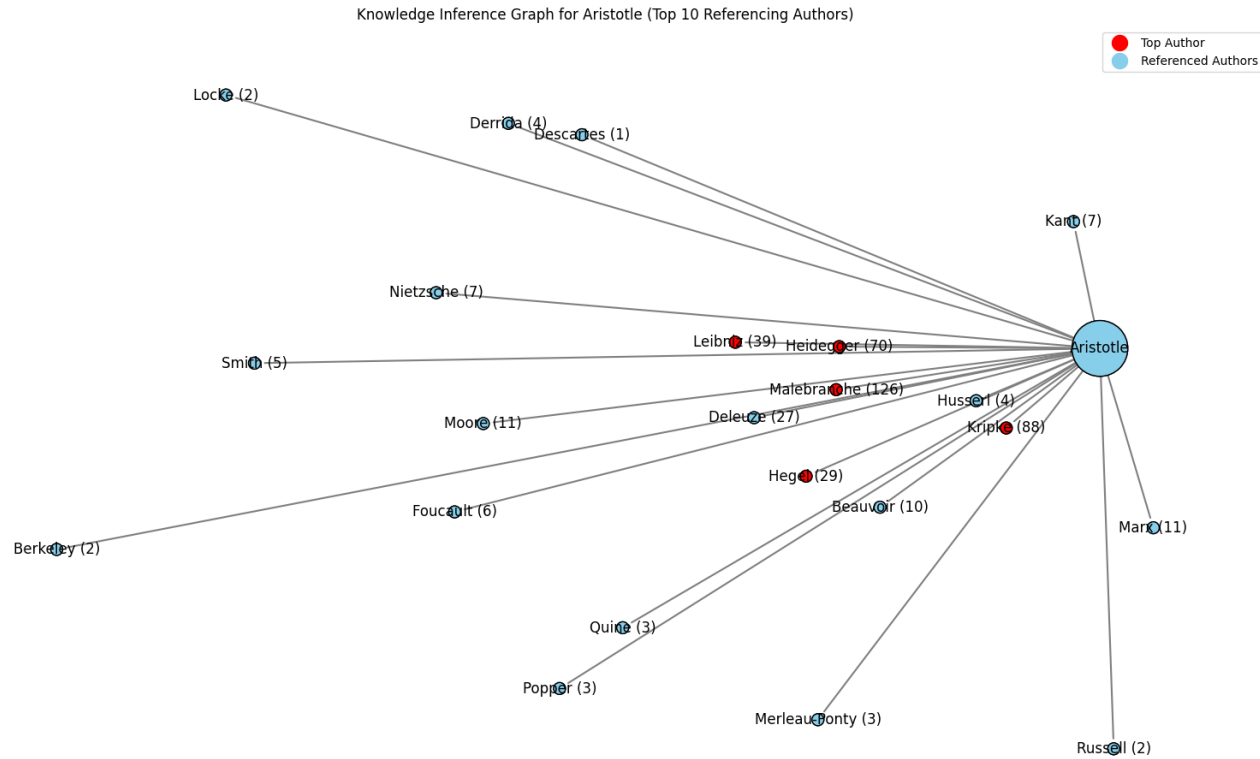
The graph highlights Bertrand Russell's central role in 20th-century philosophy, with frequent references by major figures such as Kripke (448), Quine (53), and Wittgenstein (35). Russell's influence is particularly evident in analytic philosophy, with strong ties to foundational areas like logic, philosophy of language, and epistemology.

Less frequent but notable references (e.g., Popper (16), Deleuze (3), Marx (2)) demonstrate the broader impact of Russell's ideas beyond analytic philosophy, engaging with traditions like critical theory and post-structuralism. Themes such as logical positivism, mathematical philosophy, and social thought emerge as key areas of influence.

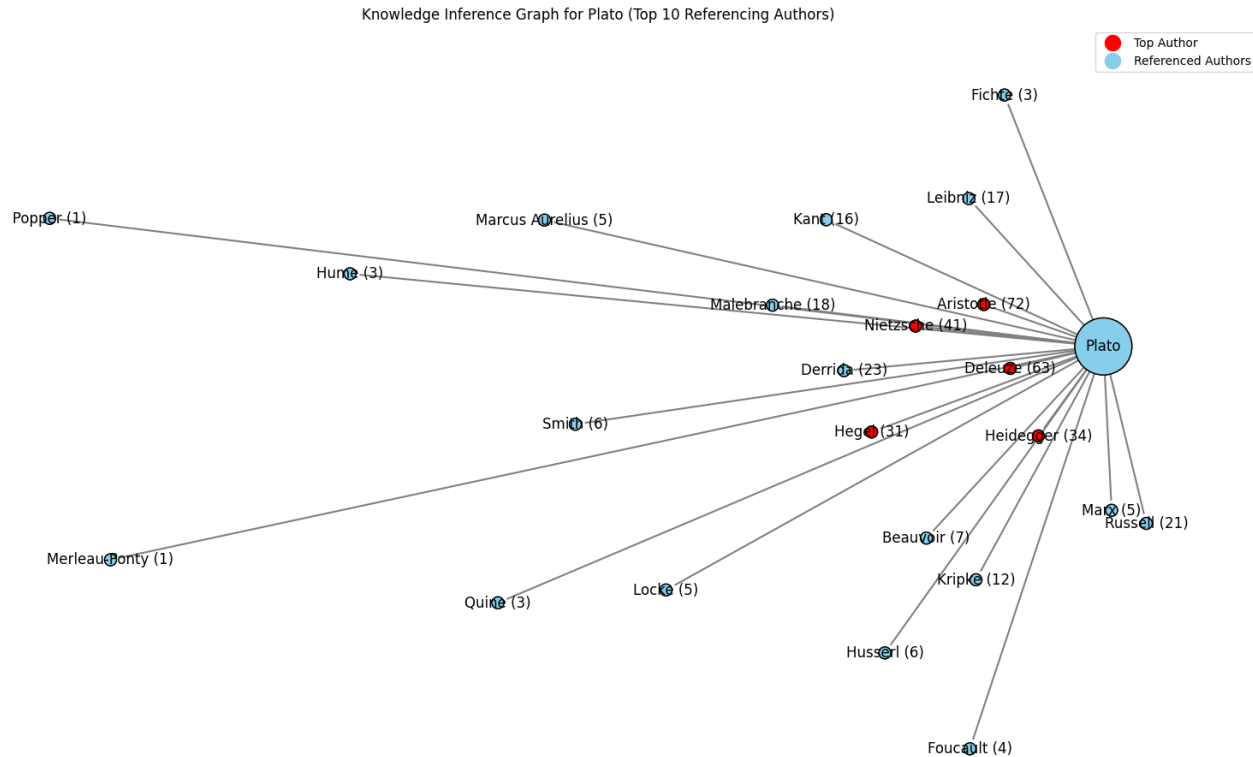


The graph emphasizes Immanuel Kant's monumental influence, showcasing frequent references by key figures such as Hegel (144), Husserl (77), and Heidegger (68). Kant's foundational role in German Idealism and his impact on phenomenology and existentialism is clearly evident.

Other significant references, including Nietzsche (43), Fichte (42), and Deleuze (71), highlight Kant's pervasive influence in critiquing and evolving philosophical ideas across traditions. Less frequent but notable connections with figures like Foucault (17) and Beauvoir (2) reflect Kant's relevance in critical theory, ethics, and feminist philosophy. Key themes such as epistemology, metaphysics, and moral philosophy underline Kant's enduring importance.



The graph highlights Aristotle's vast influence across philosophy, with strong connections to key figures like Malebranche (126), Kripke (88), and Heidegger (70). His work underpins diverse areas, from medieval metaphysics (Malebranche) to contemporary logic (Kripke). Thinkers like Marx (11) and Nietzsche (7) show his broader applicability, while Locke (2) and Descartes (1) reflect more targeted engagements. Aristotle's core ideas—causality, substance, and ethics—remain central, shaping intellectual thought for centuries.



The graph showcases Plato's foundational influence across philosophy, with strong references from Aristotle (72), Hegel (31), and Nietzsche (41), underscoring his centrality to metaphysics, ethics, and epistemology. Thinkers like Heidegger (34) and Derrida (23) highlight Plato's enduring role in existentialism and deconstruction, while Leibniz (17) and Kant (16) reflect his impact on rationalism and idealism.

Broader connections, such as to Russell (21) in analytic philosophy and Malebranche (18) in theology, demonstrate the diversity of his influence. Less frequent references, like Marcus Aurelius (5) and Foucault (4), reveal Plato's relevance to ethics and power dynamics. Overall, the graph underscores Plato's timeless contributions to shaping philosophical thought.

3.3. Results of Research Question #3

The result shown is picked randomly from the dataset, for the full version [here](#).

3.3.1. Philosophical Investigations by Wittgenstein

1. Title: Philosophical Investigations
2. Author: Wittgenstein
3. School of thought: Analytics
4. What is the main purpose of education?

The text suggests that the main purpose of education is to facilitate learning through various forms of engagement with language and concepts. Education is not merely about imparting knowledge but about helping individuals understand the use and meaning of words, concepts,

and the activities associated with them. This is illustrated by the emphasis on the difference between knowing mathematical definitions and engaging in mathematical activity.

5. What key educational methods are mentioned?
 - a. Learning through use: The idea that one learns the meaning of words and concepts through their applications rather than through explanations alone ("let the use of words teach you their meaning").
 - b. Experiential learning: The notion that concepts are learned through engagement in activities (e.g., learning to calculate or understanding motives is achieved through practical engagement with those concepts).
 - c. Imitation and interaction: The process of teaching and learning is depicted as a form of mutual understanding and agreement, where learners come to share a common language and understanding of concepts.
6. What are the expected outcomes of education?
 - a. Acquisition of practical skills: Learners develop skills and knowledge that are applicable to real-world contexts (such as calculating).
 - b. Understanding of concepts: Learners gain a deeper comprehension of the meaning behind terms and concepts that are not just theoretical but applicable in various situations.
 - c. Social and cognitive development: The text hints at the idea that education leads to a greater understanding of human motives, states of mind, and social dynamics, which allows individuals to make more informed judgments about others.
7. What is the relationship between teacher and student?

The relationship between teacher and student is characterized as a collaborative learning experience. The teacher guides the student in understanding concepts through shared activities and dialogue. The text emphasizes that learning cannot be purely directive; instead, it involves the teacher and student engaging together in the process of acquiring knowledge. There is a recognition that teachers can facilitate understanding but that the learning itself is a subjective experience for the student, shaped by their interactions and experiences.

3.3.2. The Birth of a Clinic by Foucault

1. Title: The Birth of a Clinic
2. Author: Foucault
3. School of Thought: Continental
4. What is the main purpose of education?

The main purpose of education, as inferred from the text, is to produce knowledge that assists in identifying and understanding diseases, as well as to train medical professionals who can provide care and treatment. This education is not merely about accumulating facts, but is

aimed at cultivating a rational and well-founded body of medical knowledge that is necessary for successful medical practice.

5. What key educational methods are mentioned?
 - a. Clinical observation and practice at the patient's bedside, allowing students to learn directly from real-life cases ("young men learnt medical science at the patient's bedside").
 - b. The use of a dual framework of systematic knowledge and practical learning where students must engage with concrete cases in a hospital setting.
 - c. The integration of both theoretical instruction and clinical practice, ensuring that medical knowledge is both encyclopaedic (general knowledge) and concrete (specific to patient care).
 - d. Emphasis on collaborative learning environments where students can learn from each other and from the experiences of their teachers, through methods such as observations pre-requisites for practical application.
6. What are the expected outcomes of education?
 - a. The successful identification and treatment of diseases by medical practitioners who possess an accurate and comprehensive understanding of pathological phenomena.
 - b. A shift towards a practical, effective, and patient-oriented medical knowledge that reflects a deeper understanding of life and health, rather than abstract theories.
 - c. Development of a medical professional class that is informed, competent, and able to directly address the health needs of the populace while maintaining ethical considerations (such as kindness and respect for the patient).
 - d. Creation of a scientifically-based collective medical consciousness that can contribute to public health improvements through ongoing education and awareness.
7. What is the relationship between teacher and student?
 - a. A hierarchical yet collaborative dynamic where teachers guide students through the complexities of medical knowledge while fostering independent learning through clinical exposure.
 - b. The expectation that teachers are both authorities in knowledge and practitioners who demonstrate this knowledge in real clinical settings, thereby serving as mentors.
 - c. An implicit understanding that education is a reciprocal process where students actively engage with knowledge while teachers benefit from the fresh perspectives and observations brought by students.
 - d. A system where students are expected to observe and internalize lessons from their teachers' clinical practices, resulting in a mentorship that is grounded in practical, lived experience rather than solely theoretical instruction.

3.3.3. **Beyond Good and Evil by Nietzsche**

1. Title: Beyond Good and Evil
2. Author: Nietzsche
3. School of Thought: Nietzsche
4. What is the main purpose of education?

The text suggests that education serves multiple purposes, primarily aimed at understanding oneself and the underlying instincts that govern human nature. Nietzsche emphasizes the significance of critical questioning and the exploration of truth rather than merely accepting asserted truths. Education is also portrayed as a means to free individuals from societal constraints and to achieve self-knowledge. It prepares individuals for greater responsibilities and capabilities in society, promoting an awareness of the complexities of human existence.

5. What key educational methods are mentioned?
 - a. Encouraging questioning and critical thinking: "the famous Truthfulness of which all philosophers have hitherto spoken with respect, what questions has this Will to Truth not laid before us!"
 - b. Challenging traditional norms and perceptual frameworks: "It is high time that we should understand that such judgments must be believed to be true, for the sake of the preservation of creatures like ourselves."
 - c. Engaging with the ethical and moral dimensions of knowledge, potentially highlighting the interactions between different thoughts and instincts present in individuals.
6. What are the expected outcomes of education?
 - a. A growth in self-awareness and reflection: "the desire for freedom of will in the superlative, metaphysical sense... involves nothing less than to be precisely this and, with more than Munchausen daring, to pull oneself up into existence by the hair, out of the slough of nothingness."
 - b. The ability to confront and harmonize one's inner drives with the external world's expectations, leading to a richer understanding of life: "he knows how unexhausted man still is for the greatest possibilities."
 - c. Ultimately, it aims to cultivate "the new philosopher and commander," who can navigate and reshape the societal landscape through a nuanced understanding of both personal and collective morality.
7. What is the relationship between teacher and student?

The text suggests a complex relationship characterized by mutual respect and a recognition of the student's emerging individuality: "he meets with suitable auxiliaries who will shorten and lighten his task." There's a significant emphasis on the teacher being a guide or facilitator who respects the processes of learning and encourages independence. The teacher must challenge

the student to think critically and self-reflectively while also acknowledging their limitations and biases. The teacher's role extends beyond mere instruction to include being a mentor in philosophical and personal development.

3.3.4. Essential Works of Lenin

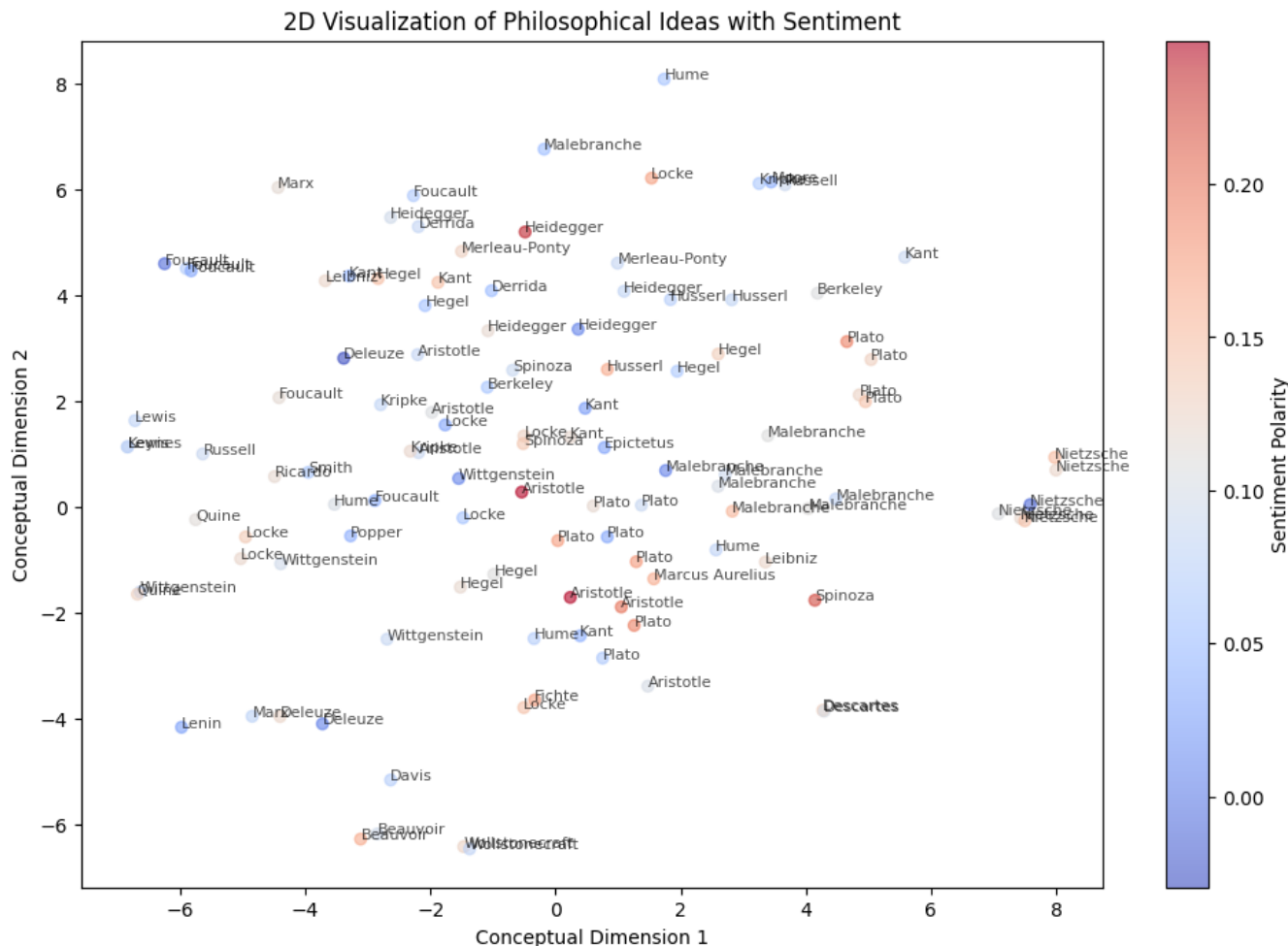
1. Title: Essential Works of Lenin
2. Author: Lenin
3. School of Thought: Communism
4. What is the main purpose of education?
 - a. The main purpose of education in the context of Lenin's discourse is to provide political knowledge and political education to the working class. It serves to cultivate a conscious understanding of their social and economic reality, enabling them to engage in revolutionary activities and to combat the ideological influence of bourgeois society. Education aims to elevate the proletariat's class consciousness and empower them with the tools necessary to challenge oppression and exploitation.
5. What key educational methods are mentioned?
 - a. The text mentions several educational methods including propaganda, political agitation, and active engagement with varied social classes. It emphasizes the need for a revolutionary elucidation of the system, the use of leaflets to raise awareness about workers' conditions, and direct participation in the political life of society. Education should also be conducted through the creation of organizations capable of providing ongoing guidance and training for the working class and intellectuals alike.
6. What are the expected outcomes of education?
 - a. Expected outcomes of education include a heightened political consciousness among workers, the development of a revolutionary mindset, and the ability to grasp the complex relationships between different social classes. Lenin also anticipates that educated workers will engage in organized political struggles, demonstrate demands, and cultivate an understanding of their oppression and the broader political landscape, ultimately contributing to the revolution against capitalist structures.
7. What is the relationship between teacher and student?

The relationship between teacher and student is portrayed as one of guidance and empowerment. Educators (often represented by intellectuals and the revolutionary vanguard) bear the responsibility to deliver political knowledge to students (workers) who are in need of education to improve their understanding. There is an emphasis on mutual respect, but also a clear expectation that teachers must elevate the consciousness of the students rather than lowering themselves to the level of the students' current understanding. The educators are

seen as guides who help articulate the shared struggles and needs of the working class while pushing for a collective awakening to their potential for revolution.

3.4. Results of Research Question #4

The 2D visualization represents philosophical ideas based on their semantic embeddings, with sentiment polarity indicated by color. This allows us to explore both thematic relationships and emotional tones.



Axes

- Conceptual Dimension 1 & 2: These axes capture the most significant variations in the data, helping visualize relationships between philosophical ideas.

Clusters and Groupings

- Clusters: Philosophers with similar ideas are grouped together. For instance, multiple instances of the same philosopher (e.g., Plato, Aristotle) are close to each other, indicating consistent thematic content.
- Proximity: Philosophers located near each other share conceptual similarities. For example, Nietzsche and Kierkegaard might be close due to overlapping existential themes.

Sentiment Polarity

- Color Scale: The color bar indicates sentiment polarity, ranging from blue (neutral or negative) to red (positive).
- Color Distribution:
 - Blue hues: Indicate more neutral or negative sentiment. Philosophers like Marx and Foucault, who often critique societal structures, might show more neutral/negative sentiment.
 - Red hues: Indicate more positive sentiment. Philosophers like Nietzsche, known for affirming life and creativity, might show more positive sentiment.

Examples

1. Classical Philosophers:
Plato and Aristotle: Close together, suggesting shared themes in classical philosophy. Their slightly positive sentiment might reflect discussions on ideal forms and ethics.
2. Existential and Modern Thinkers:
Nietzsche and Kierkegaard: Positioned near each other, possibly due to existential themes. Their sentiment might lean positive due to themes of individualism and overcoming challenges.
3. Critical Theorists:
Marx and Foucault: Grouped together, reflecting their focus on critiquing societal structures. The blue hue indicates a more neutral or negative sentiment, likely due to themes of oppression and power dynamics.
4. Empiricists and Rationalists:
Hume and Locke: Close proximity suggests shared themes in empiricism. Their sentiment might be neutral as they focus on observation and experience.
5. Continental Philosophers:
Heidegger and Derrida: Positioned together, indicating shared themes in phenomenology and deconstruction. Their sentiment might be neutral, reflecting complex and often critical analyses of existence and language.
6. Enlightenment Thinkers:
Kant and Hegel: Positioned near each other, reflecting shared themes in German idealism. Their sentiment might be slightly positive, indicating discussions on progress and reason.
7. Analytic Philosophers:
Wittgenstein and Russell: Close together, suggesting a focus on language and logic. Their sentiment could be neutral, as they often engage in analytical and logical discourse.
8. Political Philosophers:
Locke and Rousseau: Grouped together, indicating themes of social contract and governance. Their sentiment might be slightly positive, reflecting optimistic views on human nature and society.
9. Phenomenologists:
Husserl and Merleau-Ponty: Positioned near each other, highlighting shared interests in consciousness and perception. Their sentiment might be neutral, focusing on descriptive analyses of experience.
10. Postmodern Thinkers:

Deleuze and Derrida: Close proximity suggests themes of deconstruction and post-structuralism. Their sentiment might be neutral to negative, reflecting critiques of traditional structures and meanings.

4. DISCUSSIONS AND CONCLUSIONS

The application of machine learning techniques to the study of philosophical texts has unveiled new dimensions in understanding the evolution of educational philosophy. Our analysis has shown that educational thought has not only varied across time but has also reflected broader cultural, political, and scientific shifts.

- **Thematic Evolution:** The initial focus on ethical and moral education in Ancient philosophy, as evidenced by themes around "man," "good," and "god," transitioned to a more diverse exploration in modern times, incorporating language, science, and economics. This suggests that educational philosophy has been responsive to the intellectual zeitgeist of each era.
- **Sentiment Analysis:** The emotional tones associated with these themes provide insight into how philosophers view education's role in society. For instance, the relatively positive sentiment in discussions around language and science might indicate optimism about human potential and progress, while the more neutral or negative tones in critiques of power dynamics in education reflect skepticism or concern about existing systems.
- **Interconnectivity of Ideas:** The knowledge graphs and concept maps have illuminated the influence and cross-pollination among philosophers. This interconnectedness, particularly evident in the influence of figures like Descartes and Kant, shows how foundational ideas in education have been built upon and critiqued by subsequent thinkers, creating a rich tapestry of educational thought.
- **Methodological Insights:** Our use of machine learning has circumvented some limitations of traditional hermeneutic methods, such as subjectivity and scale, allowing for a broader, data-driven perspective. However, this approach also brings challenges, including the need for careful selection and interpretation of data to avoid misrepresentation or oversimplification of complex philosophical ideas.
- **Implications for Education:** These findings underscore the need for educational systems to reflect on their historical roots while adapting to contemporary societal needs. Understanding these philosophical shifts can inform current debates on curriculum design, teaching methodologies, and the broader objectives of education, whether they be social mobility, personal development, or civic responsibility.

This study has demonstrated the potential of computational methods in the humanities, specifically in enriching our understanding of educational philosophy. By tracing a lineage from Ancient Greek *paideia* to postmodern critiques, we have shown that education's purpose is not static but is continually reinterpreted through the lens of each era's predominant concerns and values. Our research confirms the enduring debate on education's role but also highlights how these debates are influenced by broader philosophical movements. The insights gained here can guide educators, policymakers, and philosophers in reconceptualizing education to meet the challenges of the 21st century, ensuring that educational practices are not only rooted in tradition but also forward-looking.

Future research could extend this analysis to include non-Western philosophical texts to offer a more global perspective on educational thought. Additionally, integrating dynamic models that can account for real-time changes in educational philosophy would provide ongoing insights as new philosophical works emerge. Ultimately, this study serves as a bridge between technology and philosophy, advocating for an interdisciplinary approach to understanding one of humanity's most fundamental institutions: education.

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