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Mapping the Modern History of the Philosophy of Religion with Machine Learning

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Many thanks to Dr. Nathan R.B. Loewen, a kind and wise mentor.
Mapping the Modern History of the Philosophy of Religion with Machine Learning

Jackson C. Foster
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Abstract
A current debate in the philosophy of religion (PoR) is about future routes for scholarship. While many scholars have assessed where the subfield could expand, few have consulted the discipline’s modern history in their evaluations. Thus, the aim of “Mapping the Modern History of the Philosophy of Religion” is to propose a computationally-based history of PoR as a foundation for future growth. To that end, this research processes over three-thousand articles from three journals in PoR with latent Dirichlet allocation (LDA), a machine-learning algorithm. LDA creates groups of related terms, exhibiting the most historically significant topics in the subfield. Within each group, additional programming techniques highlight key documents, authors, and citations. “Mapping the Modern History” represents the novel application of digital tools to philosophical source material, and it builds upon these computational approaches to demonstrate the dominant trends in PoR: namely, analytic approaches to theistic subjects.

Keywords: Philosophy, Religion, Theory and Algorithms, Machine Learning

1. Introduction

Traditional research in philosophy relies on “conceptual analysis and close reading of philosophical texts” (van Wierst et al. 1). In this manner of research, a scholar consults primary and secondary sources, using the latter as an “interpretive guide” to the former (Betti et al. 297).
This approach culminates in a defensible qualitative assessment of the scholar’s selected content. Yet philosophical texts are “complex and conceptually dense,” so this analysis is “time-consuming” (van Wierst et al. 1). Further, a researcher “following [this] traditional method” can only process a “small quantity of source material” (Betti et al. 298). These limitations “can be mitigated by the use of computational tools” (van Wierst et al. 1).

The benefits of integrating digital tools with philosophical texts are manifold. New technologies require methodological assumptions novel to philosophy and inspire valuable reflection (Loewen and Foster 5). Additionally, computational techniques address issues of scale to expand philosophical inquiry. Arianna Betti et al. and James A. Overton, for example, utilize text mining principles to survey 367 and 781 articles respectively (Betti et al. 304 and Overton 1383). Unfortunately, projects like Betti et al. and Overton’s are atypical in philosophy, and non-existent in the philosophy of religion.

Comparable to the lack of digital approaches in the philosophy of religion is the subfield’s limited critical scholarship. Generally, “quarrel[s]” in the philosophy of religion are “based on old ideas and dated methods” (Duméry qtd. in Boutin 516). Most notable of these ‘ideas and methods’ are analytic philosophy, theism, and their combination, analytic theism. Theism is best defined by its aims: it emphasizes providing a “coherent account” of God’s nature and “cogent arguments” for God’s existence (Swinburne 3). Analytic philosophy, meanwhile, is a method. The analytic philosopher is “someone who knows how to use [different conceptions and techniques of analysis], through training in modern logic and study of the work of their predecessors” (Beaney 26). Thus, analytic theism is a method applied to a goal: rigorous, logical argumentation concerning God’s nature and existence, occasionally in consultation with Wittgenstein, Russell, and Moore (the aforementioned ‘predecessors’).
Scholars perceive analytic philosophy, theism, and analytic theism as the foci of the anglophone philosophy of religion. In their examination of the *Philosophical Review*, Joel Katzav and Kris Vaesen claim that analytic perspectives “triumph[ed]” over their speculative counterparts in the 1950s (788). Michael Beaney posits that this triumph continues presently; he states, “Analytic philosophy is now … seen as the dominant philosophical tradition in the English-speaking world” (3). Theism is understood similarly. Nathan Loewen notes that, of the thirty-four entries in 2011 *Oxford Studies in the Philosophy of Religion*, only one discusses “a topic without reference to theism” (3). Moreover, steadfast analytic theists — namely Richard Swinburne, Alvin Plantinga, and William Lane Craig — appear to be among the specialty’s eminent philosophers.

This account of the subfield, however, is anecdotal: it should “not be taken literally,” since “not every relevant source” has been considered (Betti et al. 298). By contrast, this paper references over three-thousand research articles in the philosophy of religion, computationally analyzing these texts to offer a more complete construction of the discipline. In doing so, it demonstrates the subfield’s established orientations and contributes to the nascent “field of data-driven history of philosophy” (Betti et al. 295).

2. Method

The present research consists in (Section 2.1) creating a corpus (group) of 3,229 research articles from three journals in the philosophy of religion; (Section 2.2) implementing digital tools to highlight key topics, terms, and authors within the corpus; and (Section 2.3) evaluating these computationally-produced results (for a related overview, see Betti et al. “Method and corpora”).

2.1 Constructing a Corpus

Building a corpus involves “theory-laden” choices in service of a desired outcome (Betti et al. 327). The corpus at issue is designed to generate an image of the subfield and its proximate
causes. It begins with three anglophone publications in the discipline: the *International Journal for the Philosophy of Religion* (IJPR), *The Journal of Religion* (JR), and *Religious Studies* (RS). Crucially, each of these journals assumes a nonpartisan editorial policy; this neutrality helps the corpus reflect the whole subfield.¹ The IJPR, for instance, adopts “no single institution or sectarian school, philosophical or religious” (“Aims and scope”). Another practical reason to select these publications is their easy access through JSTOR’s “data for research” feature.

Still, the corpus must be more “narrowly constrained” to create meaningful products (Loewen and Foster 10). It is therefore limited to include only research articles published from 1970 to 2015 (in the IJPR, JR, and RS). Collecting research articles (as opposed to book reviews, review articles, etc.) prioritizes ‘original research’ in the corpus. Starting in the seventies ensures consonance with the modern philosophy of religion. The subfield, by that point, had developed emphases that continue in kind today (see Taliaferro, who observes that the “philosophy of religion … gradually emerged … in the mid-twentieth century”). Further, the youngest journal in the corpus, the IJPR, was formed in 1970. (The oldest, JR, published in 1921; RS in 1965.) The corpus is as below after these changes:

<table>
<thead>
<tr>
<th>Journal Title</th>
<th>Date Range</th>
<th>N. Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religious Studies</td>
<td>1970-2013</td>
<td>1450</td>
</tr>
</tbody>
</table>

This corpus is later divided into ‘periodized’ subcorpora: one composed of 1,170 articles from 1970 to 1985, another of 999 articles from 1985 to 2000, and a final of 1,060 articles from 2000 to 2015.

¹ Other leading journals, like Sophia, support specific themes or methods in their editorial policy.
2.2 Digital Techniques

The digital portions of this research are conducted in R, a “[programming] language … for statistical computing and graphics” (“What is R?”). Because of its statistical nature, R is able to manage large data sets (e.g. 3,229 research articles). It also has numerous resources devoted to text mining: packages (downloadable, custom code), books (see Silge and Robinson, “Text Mining with R”), and tutorials. These properties allow the corpus to be assembled and processed in the same R ‘environment,’ guaranteeing data integrity.

This research’s technical procedure is summarized as follows. First, (this is done outside of R) JSTOR “data for research” supplies texts in the philosophy of religion and their associated metadata. The texts that fit the theoretical constraints of Section 2.1 (i.e. year and article type) are inputted, constituting the corpus digitally. Next, a machine learning algorithm, latent Dirichlet allocation (LDA), groups words in the corpus to uncover topics aligned with analytic philosophy, theism, and analytic theism. These topics are displayed in visualizations to ease understanding. Lastly, additional programming techniques query important articles, authors, and citations within the topics, assisting the scholar in qualitative valuation. This procedure is applied to the series of subcorpora in Section 2.1.

Readers familiar with machine learning may appreciate a more detailed discussion of the preceding outline. After input and modification, the digital corpus is converted to a table with three columns: article title, word, and n. word occurrences per article. This table, in turn, is transformed into a document-term matrix (DTM). Unlike the initial table, the DTM measures term (word) frequency via tf-idf (term frequency-inverse document frequency). Words with ‘low’² tf-idf scores are removed from the DTM, as the “highest” tf-idf terms “often … best characterize the topic[s]”

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² That is, less than the median tf-idf of the whole corpus.
in a document (Rajaraman and Ullman 8). To extract these topics, LDA, “a generative probabilistic model,” is run on the DTM (Blei et al. 996). The “basic idea” of LDA is “that documents are … mixtures [of] latent (hidden) topics, where each topic is … a distribution [of] words” (Blei et al. 996, parenthetical added). In the excerpt (from Stewart C. Goetz’s “Belief in God Is Not Properly Basic”), LDA has identified two such topics:

Figure 1: Each color represents the topic from which the word originates (see Blei et al. Figure 8).

<table>
<thead>
<tr>
<th>Topic 1</th>
<th>Topic 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>property</td>
<td>belief</td>
</tr>
<tr>
<td>properties</td>
<td>plantinga</td>
</tr>
<tr>
<td>aquinas</td>
<td>proposition</td>
</tr>
<tr>
<td>infinite</td>
<td>propositions</td>
</tr>
<tr>
<td>temporal</td>
<td>theist</td>
</tr>
</tbody>
</table>

“In propositions (9)-(12) the properties of God of which Plantinga says I am aware involve certain of God’s activities … Now Plantinga, being a theist, holds that God is a being with distinctive properties.”

Documents (and, by extension, document-level metadata) are linked to their principal LDA topic through posterior distribution, a probability function; a high posterior distribution of one topic in a document indicates a strong topic-document connection.

2.3 Interpretative Theory

Analysis of computational outcomes requires a “qualitative interpretive framework” (Betti et al. 327). The ‘interpretive framework’ of this research borrows heavily from Arianna Betti and Hein van den Berg’s “model approach to the history of ideas.” The ‘model approach’ is articulated by premises (a)-(c) and propositions (1)-(2).

(a) At some time, idea \( x \) contains elements \( a, b, \) and \( c \); idea \( x \) is equivalent to \( abc-in-x. \)

(b) At some other time, idea \( x \) contains elements \( a, d, \) and \( e \); idea \( x \) is equivalent to \( ade-in-x. \)

(c) Element \( a \) is a continuous element of idea \( x; b, c, d, \) and \( e \) are not.
Therefore:

(1) Element \( a \) is a core element of idea \( x \); \( b, c, d, \) and \( e \) are marginal elements.

(2) Idea \( x \) is a “complex relational [structure] with both stable [core] and variable [marginal] elements” (Betti et al. 301).

Through premises (d)-(f) and propositions (3)-(4), the present research analogizes Betti and van der Berg’s ‘model’ scheme to the evolution of a discipline (in this case, the philosophy of religion).

(d) At some time, field (subfield) \( y \) contains ideas \( h, i, \) and \( j \); field \( y \) is equivalent to \( \text{hij-in}-y \).

(e) At some other time, field \( y \) contains ideas \( h, k, \) and \( l \); field \( y \) is equivalent to \( \text{hkl-in}-y \).

(f) Idea \( h \) is a continuous element of field \( y \); \( i, j, k, \) and \( l \) are not.

Therefore:

(3) Idea \( h \) is a core element of field \( y \); (ideas) \( i, j, k, \) and \( l \) are marginal elements.

(4) Field \( y \) is a “complex relational [structure] with both stable [core] and variable [marginal] elements” (Betti et al. 301).

Thus this research uses periodized LDA (Section 2.2) to map both the stable and variable elements of the subfield; stable elements (suspected to be analytic philosophy, theism, and analytic theism) are ‘core’ to the philosophy of religion, while variable elements are ‘marginal.’

3. The Modern History of the Philosophy of Religion

3.1: 1970-1985

William Hasker describes the “seventies and early eighties” as the “adolescence” of the analytic philosophy of religion (1). In this formative season, he explains, analytic philosophy abandoned its “overwhelming preoccupation … with religious language” in favor of the “philosophy of theism” (Hasker 1). The LDA model from 1970 to 1985 is, in many respects, congruent with Hasker’s perception. The table below exhibits this model; it lists the LDA topic,
the n. articles related to the topic, the topic’s three most statistically relevant terms, and the topic’s (qualitative) classification:

Table 2: LDA topics ordered by number of constituent articles.

<table>
<thead>
<tr>
<th>Topic</th>
<th>N. Articles</th>
<th>Terms</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>175</td>
<td>beliefs, experiences, hick</td>
<td>analytic</td>
</tr>
<tr>
<td>6</td>
<td>160</td>
<td>property, plantinga, contingent</td>
<td>analytic theism</td>
</tr>
<tr>
<td>10</td>
<td>131</td>
<td>hegel, tillich, finite</td>
<td>phil. theology</td>
</tr>
<tr>
<td>8</td>
<td>125</td>
<td>moral, evil, morality</td>
<td>analytic theism</td>
</tr>
<tr>
<td>9</td>
<td>121</td>
<td>jesus, christ, kierkegaard</td>
<td>phil. theology</td>
</tr>
<tr>
<td>3</td>
<td>111</td>
<td>hume, miracles, swinburne</td>
<td>analytic theism</td>
</tr>
<tr>
<td>4</td>
<td>102</td>
<td>mystical, buddhism, mysticism</td>
<td>‘mysticism’</td>
</tr>
<tr>
<td>5</td>
<td>98</td>
<td>niebuhr, political, barth</td>
<td>political</td>
</tr>
<tr>
<td>7</td>
<td>81</td>
<td>religions, ritual, eliade</td>
<td>psychology</td>
</tr>
<tr>
<td>2</td>
<td>66</td>
<td>augustine, aquinas, merton</td>
<td>catholic</td>
</tr>
</tbody>
</table>

Harker correctly recognizes the growth of analytic theism. Topic six, for example, encompasses theistic arguments and properties in an analytic style. Its characteristic terms include “ontological” and “cosmological” (arguments); “omniscience” and “omnipotence” (properties); “Plantinga” and “Rowe” (analytic philosophers); and “contingent” and “worlds” (analytic logic).

It also contains refutations of process theism, a metaphysical alternative to analytic philosophy (see Robert Oakes’ “Classical Theism and Pantheism: A Victory for Process Theism?”). Topic three comprises the analytic defense to Humean (that is, of David Hume) attacks on theism. Catalyzed by Richard Swinburne’s efforts, analytic theists revisited Hume’s critique of miracles and the design argument. Topic eight centers on the problem of evil and morality. Its terms (once more) demonstrate an analytic commitment to theism. “Command” and “obligation,” parts of an analytic, theistic approach to morality (the “Divine Command Theory”), occur over two-thousand times in topic eight.

However, the largest topic, one, is composed of religious language, as well as experience and epistemology. It depicts the analytic shift from logical positivism to Wittgenstinian thought in
language and experience. John Hick, who introduced a Wittgensteinian “pluralistic hypothesis,” is the third most relevant term in the topic. (Other salient philosophers, like D.Z. Phillips and Kai Nielsen, debated “Wittgensteinian fideism.”) Epistemology appears as a contested territory: analytic philosophers (proper) undermined the rationality of belief, but theists upheld it.

It is vital to situate these topics within the overall discipline. Other discourse is slight in comparison to topics one, three, six, and eight; they account for approximately forty-eight percent of the subcorpus, or 571 articles. Nonetheless, points of interest exist in the subfield’s margins. For instance, the topics in philosophical theology (nine and ten) evidence conflicting methods; nine is exegetical (hence “jesus” and “christ”), ten is phenomenological (hence “hegel” and “tillich”). Non-theistic religions, moreover, are examined through the lense of “mysticism” (topic four) and “ritual” (topic seven).

3.2: 1985-2000

The LDA model from 1985 to 2000 marks the continued coalescence of analytic philosophy and theism. The characteristic terms within theistic arguments and attributes (topic two) are generally consistent; this, too, is the case for evil and morality (topic four). Yet analytic theists were not stagnant: in the period, they innovated a “reformed epistemology.” Topic seven displays this newer epistemic method; its champion, Alvin Plantinga, is the topic’s second most relevant term (cited over two-thousand times). Further, topic ten catalogues the formation of “open theism.” This variation (of analytic theism) holds that God prioritizes the “freedom” of his human “agents” over determinism. Critically, these analytic, theistic topics remain the largest in subcorpus; they constitute 437 documents (forty-four percent):
Outside of analytic theism, social trinitarianism (topic eight) and postmodern philosophy (topic one) arose. The extent of philosophical theology (topic nine) dwindled. And Hick’s pluralism (topic three) moved from the analytic language canon to hermeneutics and postliberal theology. So, while analytic theism consolidated in the (mid-)eighties and nineties, the rest of the subfield evolved. This incongruence divided the discipline into “either [analytic] theism or not-theism” (Loewen and Foster 2). The unsupervised, machine-generated topic map below reveals this division: the ‘bubbles’ on the left are analytic, theistic topics, those on the right are not.

Fig 2: An LDA topic map of subcorpus 2.
3.3: 2000-2015

Hasker contends that the “last two decades have seen a notable broadening of the field of analytic philosophy of religion, with many new, or previously under-explored, topics becoming important subjects for research” (25). Here, he is misguided. Analytic philosophy and theism have done little to adjust course in the twenty-first century. In topic three, analytic philosophers again consider theistic arguments and attributes (“properties”) in light of propositional (“propositions”) and modal (“worlds”) logic. Despite a substantive challenge in the form of J.L. Schellenberg’s “problem of divine hiddenness,” reformed epistemology carries on in topic seven (hence “belief,” “plantinga,” and “epistemic”). The Wittgensteinian philosophy of language (topic ten) is reassessed, though distanced from theistic dialogue. Some analytic theists resumed the problem of “evil” and “suffering” (topic one). Other, ‘open’ (analytic) theists (topic five) persisted in their exploration of “freedom” and the “causal” power of God. These topics, in all, consist of 624 articles in (or fifty-eight percent of) the subcorpus.

Table 4: LDA topics ordered by number of constituent articles (subcorpus 3).

<table>
<thead>
<tr>
<th>Topic</th>
<th>N. Articles</th>
<th>Terms</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>141</td>
<td>beliefs, plantinga, epistemic</td>
<td>analytic theism</td>
</tr>
<tr>
<td>1</td>
<td>139</td>
<td>evil, theorem, suffering</td>
<td>analytic theism</td>
</tr>
<tr>
<td>3</td>
<td>130</td>
<td>properties, worlds, propositions</td>
<td>analytic theism</td>
</tr>
<tr>
<td>9</td>
<td>111</td>
<td>moral, love, kierkegaard</td>
<td>phil. theology</td>
</tr>
<tr>
<td>5</td>
<td>110</td>
<td>freedom, causal, laws</td>
<td>analytic theism</td>
</tr>
<tr>
<td>10</td>
<td>104</td>
<td>wittgenstein, political, religions</td>
<td>analytic*</td>
</tr>
<tr>
<td>4</td>
<td>99</td>
<td>kant, consciousness, heidegger</td>
<td>continental</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
<td>body, augustine, christ</td>
<td>catholic</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>schleiermacher, jewish, biblical</td>
<td>phil. theology</td>
</tr>
<tr>
<td>8</td>
<td>70</td>
<td>children, women, black</td>
<td>postmodern</td>
</tr>
</tbody>
</table>

In other areas, the subfield did change. Theologians and philosophers began to appraise ethics and morality with room for existential and idealist thinkers (topic nine). The discipline even incorporated continental methods (see “heidegger” in topic four). However, the subfield’s
orientation, when mapped, is similar to the previous interval: it still portrays the polarization between topics in analytic theism (now located on the right) and those not (left).

Fig. 3: An LDA topic map of subcorpus 3.

4. Conclusion

Computationally, are scholars correct to label analytic philosophy, theism, and analytic theism as the foci of the philosophy of religion? Yes and no. Analytic theism is central to the subfield, but analytic philosophy and theism, as separate entities, prove more complicated. Analytic philosophy is mutable without theism (e.g. Hick and Wittgenstein’s topical shifts), and vice versa (e.g. process theism’s disappearance). Thus the ‘digital history’ of the discipline is best expressed by premises (g)-(j) and propositions (5)-(6).

(g) From 1970 to 1985, the philosophy of religion (z) contained analytic theism (a), the analytic philosophy of language (b), process theism (c), and exegetical philosophical theology (d) amongst other ideas; the subfield z is equivalent to abcd-in-z.
(h) From 1985 to 2000, the philosophy of religion \((z)\) contained analytic theism \((a)\), an
altered philosophy of language \((e)\), social trinitarianism \((f)\), and postmodern philosophy
\((g)\) amongst other ideas; the subfield \(z\) is equivalent to \(aefg-in-z\).

(i) From 2000 to 2015, the philosophy of religion \((z)\) contained analytic theism \((a)\), a new
Wittgenstenian philosophy of language \((g)\), idealist ethics \((h)\), and continental philosophy
\((i)\) amongst other ideas; the subfield \(z\) is equivalent to \(aghi-in-z\).

(j) Analytic theism \((a)\) is a continuous element of the philosophy of religion; other elements
are not.

Therefore:

(5) Analytic theism \((a)\) is a core element of the philosophy of religion; other ideas are
marginal elements.

(6) The philosophy of religion is a “complex relational” structure with “both stable,” core
elements — analytic theism — and “variable,” marginal elements — the philosophy of
language, the study of ‘mysticism,’ theology, &c. (Betti et al. 301).

This evaluation is strengthened by the comparative size of the analytic, theistic topics: around
forty-two percent (1,353 articles) of the entire corpus (from 1970 to 2015).

It should be made evident that these computational results are not “proof texts.” Digital
products instead act as guides to the “semantic contents of … [the] corpus, … patterns of
[discourse] across a specified parameter (e.g. time, [author], location), [and] … relations[hips]
[among the corpus’] documents” (Loewen and Foster 9). They compel “researchers to formalize
their claims and test them” (Loewen and Foster 10).

Nonetheless, the constancy of analytic theism, both in its size and ideological composition,
is significant: it demonstrates that analytic theists rarely ask the questions that might re-define their
– or the subfield’s – character. Rather, the monolith that is analytic theism stifles expansion, while occupying a large portion of the discipline. With that in mind, I hope philosophers of religion view this scholarship as an empirical “reminder that other [methods and] non-theistic … traditions are worthy of philosophical exploration” (Hasker 37).
Works Cited


