

Sexual Abuse in the Catholic Church: Annotation and Machine Learning of Hidden Patterns in Abuse Reports

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Abstract.

This paper presents a computational-theological analysis of sexual abuse reports published by Catholic dioceses in German-speaking regions, with a focus on the largely overlooked experiences of women survivors. We compiled a corpus of five representative reports and developed a hierarchical annotation scheme to capture discursive patterns related to victims, perpetrators, institutional responses, and descriptions of abuse. Quantitative analyses reveal a notable number of female victims and a consistent dominance of institutional voices, while survivor perspectives appear far less frequently. Descriptions of abuse often rely on unspecific terms, reflecting discursive tendencies that obscure the nature of violence and reinforce epistemic injustice. Using sentence-level binary classification with transformer-based models, we achieved promising results (balanced accuracy ~0.8) despite class imbalance. These models enable scalable detection of text segments concerning women. The study demonstrates how DH methods can uncover hidden narrative structures in church documents and support critical theological inquiry.

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1. Introduction

The Italian Jesuit priest Roberto Busa is considered one of the most important founding fathers in Digital Humanities (DH), working on a critical edition of the works of Thomas Aquinas by collaborating with IBM (Jones 2018). In line with this tradition, computational theology has recently grown into an active field of DH (Nunn/Van Oorschot 2024). We present results of a DH project¹ focusing on a current issue in theological research of abuse: the systemic silencing of survivors' stories and the erasure of women's experiences of abuse within the Catholic Church which we understand with Miranda Fricker (2007) as an epistemic injustice (Hürten 2025). The goals of the project are to gather text corpora relevant to sexual abuse of women² in the Catholic Church (e.g. abuse reports, media texts, survivor testimonies) and prepare annotated corpora for machine learning to identify and understand their underlying "hidden patterns" (Leimgruber 2026; Haslbeck et al. 2022) which are deeply rooted structures of thought and knowledge that determine which stories gain visibility and which are silenced. The goal is to develop tools that support researchers in detecting and analyzing accounts of abuse of women in textual sources that are often hidden and therefore hard to detect. We present analysis of the annotation of one of our text types, abuse reports by catholic German dioceses and results of machine learning (ML) experiments.

2. Corpus

In recent years, more than 30 reports documenting cases of sexual abuse in the Catholic Church have been commissioned by individual dioceses or entire bishops' conferences. For our first annotation study, we focused on five representative reports from German-speaking countries/regions (Table 1).

¹ The project "Von Epistemic Injustice zu Epistemic Awareness. Prozessbasierte Methodenforschung zu Missbrauch an erwachsenen Frauen in der katholischen Kirche" (From Epistemic Injustice to Epistemic Awareness. Process-based Methodological Research on Abuse of Adult Women in the Catholic Church) is funded by the DFG (German Research Association, project number 539293243):

<https://missbrauchsmuster.de/forschen/projekte/forschungsprojekt-von-epistemic-injustice-zu-epistemic-awareness-prozessbasierte-methodenforschung-zu-missbrauch-an-erwachsenen-frauen-in-der-katholischen-kirche/>

² For the purpose of this project, we understand female individuals from the age of 14 onwards as women. Without detailing the specific church and state regulations in place in the period from 1945 onwards (period under study in most of the reports) it can generally be stated that individuals younger than 14 years are considered children and that any sexual act involving them is recognized as abuse, yet for individuals from the age of 14 additional circumstances have to apply. In this context gender-specific forms of silencing and cover-up ("hidden patterns") can be observed. These "hidden patterns" and the survivors' experiences are at the center of the project.

Diocese	# Token	# Token (relevant)	% (relevant)	# Cases	# Survivors	# Accused
Bozen-Brixen	146,414	9,618	6.6	11	23	11
Essen	185,199	3,869	2.1	7	5	2
Hildesheim	107,690	17,840	16.6	2	12	2
Cologne	250,353	6,425	2.6	12	16	12
Switzerland	57,405	7,334	12.8	8	4	4
Sum	747,061	45,086	6.0	40	60	31

Table 1. General annotation corpus statistics.

The original PDFs of the reports contain over 747,000 tokens. The longest PDF, the report from the Diocese of Cologne (Gercke et al. 2021), spans 915 pages, while the shortest, from Switzerland (Bignasca et al. 2023), comprises 136 pages. Even though most of the reports focus on underage victims, there are also cases involving adult women. Sections marked manually as relevant with regard to women survivors made for 6% of the texts. It is precisely their stories that are often overseen. In regards of the overall number and length of reports, it becomes clear that AI support in such large texts regarding detection and analysis can be a helpful tool.

3. Annotation

The annotation scheme was developed through an iterative process involving preliminary studies and collaborative discussions (Reiter 2020). It is designed to capture discursive aspects relevant to theological research on abuse. The scheme consists of 16 main categories, further divided into 122 subcategories in a hierarchical structure. Similar to other DH projects (Dennerlein et al. 2023), we intend to develop and publish a precise annotation guideline document.

In the first step of the annotation process, relevant pages from the original PDF reports addressing female victims aged 14 and older were marked, extracted, and annotated using the tool CATMA (Gius et al. 2020). The annotation categories contain, among others, information about survivors and accused, descriptions and framings of the crime or actions of the actors involved (e.g. Church officials) (Figure 1).

A well-known example is Hansjörg Vogel, who was elected Bishop of Basel in 1994.
 Already in 1995 he resigned because a woman he “had known from earlier years” was
 expecting his child.

Figure 1. Annotation example.³

4. Annotation Analyses

We discuss a portion of annotation results of an annotation by one expert annotator. Annotations serve not only as training material for machine learning, but quantitative analysis also provides initial insights and important implications for the research field and further project work (cf. Dennerlein et al. 2022; Schmidt et al. 2023; Reiter 2020; Pagel et al. 2020).

Case Constellations

One part of our research includes the analysis of case constellations and interactions of gender as well as minor and adult survivors with female victims from the age of 14 onwards being our primary focus (Table 2).

Report	# minors	# adult	# age unclear	# female	# male	# gender unclear
Bozen-Brixen	12	5	6	23	0	0
Essen	1	4	0	1	0	4
Hildesheim	10	2	0	11	1	0
Cologne	12	3	1	15	1	0
Switzerland	1	4	0	4	0	0
Sum	36	18	7	54	2	4

Table 2. Demographic distribution per report and overall.

Results show that a relevant portion of cases include adult victims and in the cases with survivors older than 14 years, male victims are very rarely included. These results refute the assumption of predominantly pedocriminal offenders within the Catholic Church⁴ and question the veracity of research focusing exclusively on abuse of minors.

³ Figure 1 provides insight into the annotation practice (Bignasca et al. 2023, 81). Annotated elements include: in blue the accused Hansjörg Vogel (gender: male, status: cleric), in light green the victim (gender: female, age: adult), in brown and yellow the description of the crimes (here: consequences of pregnancy, annotated in brown as description of the crimes_reproductive and in yellow sexual acts including penetration that must have happened previously), in dark green the bishop’s reaction in the form of his resignation, and in pink the year of the reaction. Please note that the original annotation was done in German and this is an English translation.

⁴ This assumption was first refuted for the context of the Catholic Church in Germany by Dreßing et al. (2018, p. 128), who demonstrated that pedophilic preference disorders could only be assumed for a subset of offenders within the Catholic Church.

Responses to the Allegations of Abuse

To examine the actions taken in response to allegations of abuse, we designed several annotation categories. We understand “actions” to include any sort of response or interaction related to the allegation, and we differentiate between the major actors (accused, survivors, diocesan officials). Table 3 illustrates the distribution among reports.

Report	Actions of the accused	Actions of the survivors	Actions of diocesan officials
Bozen-Brixen	1.8	0.6	14.0
Essen	0.2	0.3	0.4
Hildesheim	5.7	2.3	28.7
Cologne	5.3	0.3	21.6
Switzerland	1.8	0.6	3.8
Overall	3.7	1.2	18.1

Table 3. Percentage of annotation tokens in all relevant text markings among annotation categories.

In three reports, most actions can be attributed to diocesan officials. This contrasts with the rare descriptions of actions of accused or victims.

Furthermore, we used the “quotation” annotation category to mark the different types of reported sources in the texts (see figure 2/3).

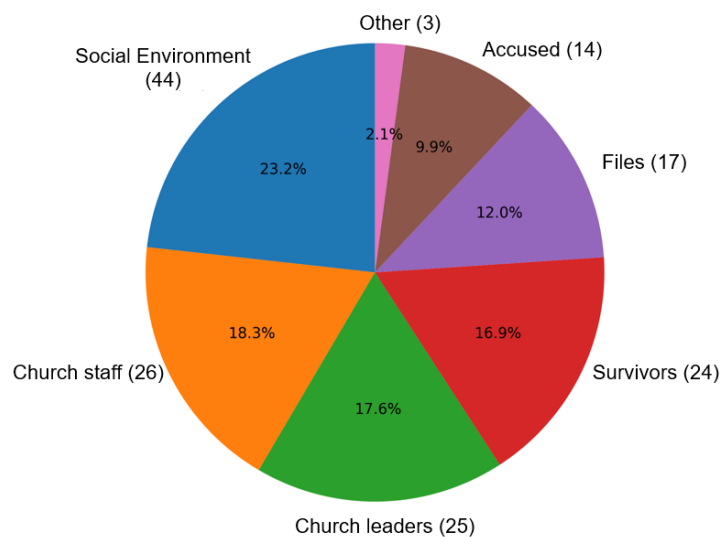


Figure 3. Distribution of “quotation” annotations.

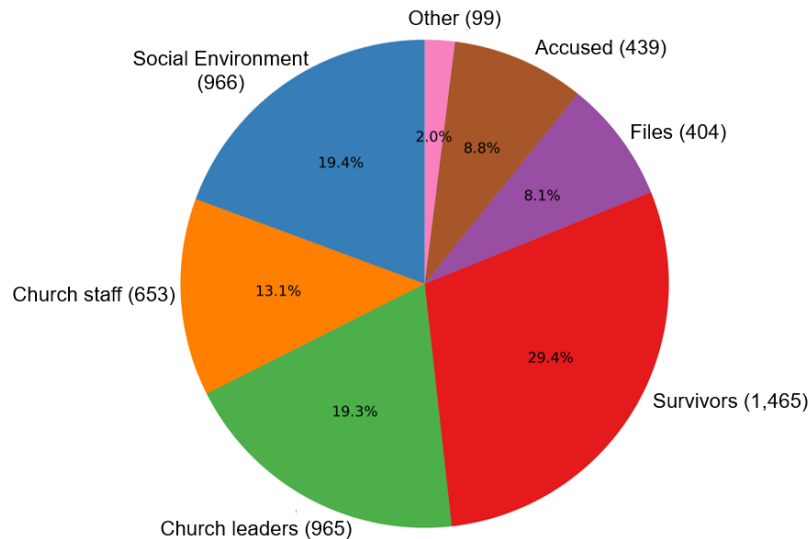


Figure 4. Distribution of “quotation” annotations measured by absolute token count.

The citations of church employees and leaders make up most annotations. However, the highest proportion of annotations in the absolute token count are survivor references, showing that, while there are few statements from victims, the reports do showcase them.

Description of the Crime

We analyzed the specific type of abuse with the annotation category “description of the crime”. As the annotations show, the analyzed reports primarily focus on sexual acts (Figure 3).

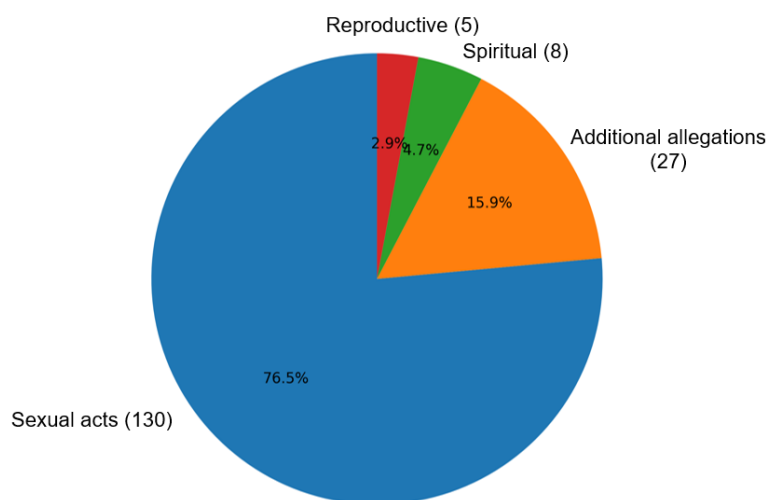


Figure 3. Distribution of “description of the crime” annotations.

Term frequency analyses show that the report authors frequently use broad terms such as "sexual abuse" (sexueller Missbrauch), "assault" (Übergriff) or "violence" (Gewalt) without specifying the exact nature of the acts. Other forms of misconduct (reproductive, spiritual)

appear, but not physical violence. This confirms that perpetrators exploit existing power dynamics and dependencies to commit these acts instead of using physical violence (Leimgruber/Reisinger 2021).

5. Machine Learning

We currently conduct various machine learning experiments using annotations with the goal of applying them to the full set of reports to gather more large-scale insights. We present initial results with the five most annotated categories as sentence-based binary classification task differentiating between the category and no annotation (by splitting the sentences of the texts into these categories). Due to the few annotations of the prediction categories, the major problem is class imbalance. We evaluated and analyzed German state-of-the-art transformer-based models (Chan et al., 2020; Wunderle et al., 2025). We found most success with a smaller German BERT model⁵ and the usage of class weights and oversampling to achieve PR-AUC scores above 0.7 for most categories pointing towards a good integration of the minority class in the prediction. To improve minority recall, we additionally oversampled using back-translation and paraphrasing.⁶ Table 4 summarizes the most important performance results relevant in class imbalance settings (# sentences of non-annotated class are 1,422).

Category	# sentences	Balanced accuracy	F1 macro	Precision minority	Recall minority	PR-AUC
Framing of the acts	171	0.90	0.90	0.89	0.81	0.90
Actions of the survivors	102	0.76	0.78	0.68	0.53	0.63
Actions of the diocesan officials	409	0.79	0.80	0.72	0.64	0.73
Description of the Crime	184	0.90	0.93	0.92	0.82	0.92
Quotation	307	0.74	0.77	0.70	0.52	0.66

Table 4. Classification results.

The current results are promising with most balanced accuracy values being around 0.8 and we apply the models on the remaining abuse reports to analyze if we can predict the specific categories and text areas dealing with the abuse of women.

6. Future Work

The results presented here are a selection of our annotation analyses. Additional heatmaps, frequency analyses, and distribution statistics are available on a GitHub repository, along with

⁵ <https://huggingface.co/google-bert/bert-base-german-cased>

⁶ Further model information: Fine-tuning for 4 epochs, learning rate of 4e-5, Adam optimizer, trained on a A100 GPU

further details on the annotation scheme and machine learning results. In the spirit of Open Science, all annotations are published.⁷

Despite the limited corpus, the analyses already reveal compelling patterns confirming previous research. In the next phase, we will focus on expanding and refining our approach. With more annotators and reports, we will validate the schema and examine whether observed distributions persist. Furthermore, more machine learning methods like zero- and few-shot learning with generative AI models will be explored to eventually perform more large-scale “distant reading” analysis on the reports and other text sorts. We also see potential in the application of semantic methods like sentiment/emotion analysis (Dennerlein et al. 2023) and topic modeling (Hellwig et al. 2024).

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⁷ https://github.com/lauchblatt/Epi_Epa

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