On Character Perception and Plot Structure of German Romance Novels

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Abstract

In this paper, we describe a plot model for German dime novel romances. Starting with the identification of essential structural parts of their plot based on scholarly analysis of romances, we then formalize this conceptual model. After a description of the corpus with its 950 novels, mostly from the last 20 years, and the annotation guidelines for the selected plot elements, we automatically detect these elements using a fine-tuned German Bert (with LoRA adapters). While it is clear how to evaluate the performance of the automatic extraction of the plot elements, it is less clear how to evaluate the quality of the model in total. We apply it to two texts and compare the result to summaries of these novels based on reading them, to discuss the strengths and weaknesses of the plot model in making aspects of the plot structure visible. For the quantitative evaluation each novel is represented as a multidimensional time series data. Classifications of this data distinguish between publishers, genres and series respectively; we see the performance in this task as an indication of the quality of the model. Finally, applying the model to a larger corpus of romance novels, we detect patterns of the genre. The more modern form of the romance novel, published by the publishing house *Cora*, is characterized by the importance of the physical perception and the reduction of the plot with the high and exclusive focus on the relationship of the lovers.

Keywords

computational literary studies, modeling plot, romance, dime novels,

1. Introduction

The formulaic love story with a happy ending, the romance, was for a long time near the bottom of the ranks of aesthetic appreciation, a place where crude horror and war stories live near the abyss which is usually inhabited by pornography. But this has changed in recent years, at least in North America. The democratization of reading, the emancipation of the popular culture, the loss of status of the elites, all this has made this elevation of the status of romance possible. Today you find a genuine interest in the genre, because it is so widely read, it creates so very intense feelings in so many readers and is comparatively under-researched and still not well-understood. This is shown in books from academics like the pioneering studies [22] and [24] and the establishment of a research community, e.g. [12]. Not the least, it is reflected in the fact that the *New York Times* is regularly publishing reviews of romance novels written by a writer of

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romance novels.[1] Discussed are the structure of romance novels, the evolution of sub-genres, or the question, whether romances are an indicator for the suppression of women, are they "pornography for women" [26] or has the genre always "promoted powerful and revolutionary messages to women" [25]? As far as we can see, this increase of research activity is mainly confined to North-America, and with very few exceptions [20] the new interest in popular entertainment in Europe has not yet extended to romance novels.

Romance – in its modern meaning – is a world-wide phenomenon as can be seen by the success the company *Harlequin* has in over 100 countries [10, 3]. On the other hand, the publication of romances is always deeply embedded in and structured by the local literary markets [31]. In German speaking countries the market for popular reading entertainment is not homogeneous, but divided in two spheres: in one market, books are sold and bought via bookshops. In the other, booklets ('Heftromane') are sold and bought via newsagents. These booklets are actually relatively short (usually between 64 and 128 pages), much shorter than novels in the book market, and each is published as part of a series. We will use the term 'dime novels' to refer to them. Dime novels are markedly less prestigious to the point that readers and publishers try to hide the booklet format. The dime novel market is divided by gender: adventure novels address men (mostly crime, science fiction, horror, western, fantasy and war) and romances address women (with sub-genres like the medical romance or the romantic suspense) [7]. Figure 1 shows the design of the covers of such romances.

Figure 1: Covers of romance dime novels. The covers on the left and right belong to 'pure' romance novels published by *Cora*. The covers in the middle are from the publisher *Kelter* and belong to the sub-genres Nobility and romantic suspense.

In Germany, the market of dime novel romances is divided between three companies: *Bastei*, *Cora* and *Kelter*. *Bastei* and *Kelter* publish almost exclusively German authors. Some of their most successful series are republications from the 1960s to the 1990s. One especially successful series consists of shortened versions of the over 200 novels of the German writer Hedwig Courths-Mahler, who published most of her novels between 1900 and 1940. *Cora* publishes a

[1] See for example Olivia Waite: Public and Private Lives, Playing Out in Four Sultry Romance Novels. New York Times 19.7.2023.

small set of German authors, but mostly translates and shortens novels from its parent company *Harlequin*. The three publishers of German romance dime novels produce about 60 romance series, each with a weekly issue, around 3.000 novels per year – though an unknown number of them are reissues.

The romance dime novels provide perfect material for Computational Literary Studies (CLS): There are many, they are comparatively short with little variance in length, and they instantiate a genre which is known to be formulaic [10, 18], even more so because they are written in accordance with the guidelines by the publishers for each series [7]. Therefore, they are excellent material for computational approaches analyzing complex matters of the fictional world like character or plot which until now resist treatment with computational methods unless reduced drastically, for example in the case of plot to one dimension [11] or four dimensions [6].

This paper builds on our earlier work, where we discussed different approaches to the modeling of plot and argued for a model which is not generic, but only applicable to a corpus with shared features [13]. This kind of model has the merit to represent more concrete elements of plots in such a way that it conforms better with the notion of plot in literary studies. With this, we follow the approach of Propp and his analysis of magical fairy tales [21], even though we did not create the list of plot elements by reading all texts in the corpus.

In this paper, we will discuss a plot model for the German dime novel romance, building on the research literature and refining it with our knowledge of German dime novel romances. This will allow us to explore a question which has been repeatedly discussed in the research on popular literature in general and on dime novels and romance in particular: How formulaic is this literature? One description which can be found quite often claims, that "They're all the same" [10, p. 127]. But as an early researcher of dime novels remarked: If all these novels really are the same, they would certainly not be read. And he already noted that in order to analyze this kind of literature, it is important to identify what remains the same and what varies in a series or genre [4]. Our plot model allows us to describe an important part of the variation in the way dime novel romances are told.

We use our model to annotate texts manually. Based on that we annotate 950 texts automatically using a fine-tuned BERT model.

One of the main problems of modeling plot is to find an adequate way to evaluate the model. We choose a qualitative and a quantitative approach. For the first, we compare the representation of the plot of two stories with a summary and our close reading. This gives us valuable insight which content aspects are retained and which are lost. For the quantitative approach, we use the automatically annotated data to represent each novel. Clustering and classifying them allows us to evaluate how much information is retained in the plot models.

Finally, we use the plot features over the progression of the model to detect typical patterns. Thus we can show that the novels by *Cora* not only emphasize the physical aspects of the relationship between the lovers, but also concentrate the plot structure on their meetings.

2. Corpus

Our corpus consists of 950 romance dime novels from five sub-genres, released by three publishers (see Figure 2). We can distinguish between several sub-genres. The most represented is the group of 'pure' or 'generic' romance novels. In the other romance genres, a romantic couple relationship is mandatory, but less dominant in the plot. The 'Heimatroman' is quite

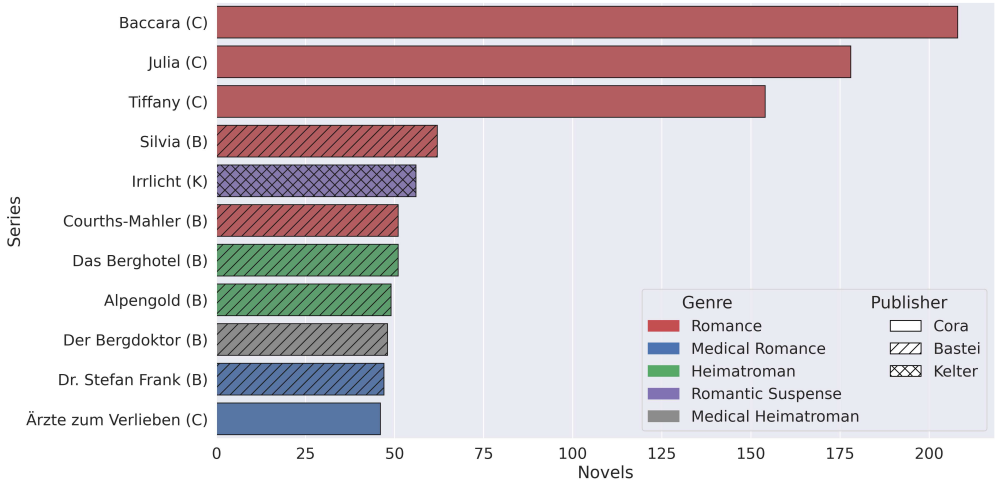

Figure 2: Number of novels per genre and publisher.

specific to the German-speaking countries. Its setting are the alpine mountain villages, where old-fashioned values are still kept alive (similar to the children's book 'Heidi'). *Medical novels* additionally depict everyday life in doctoral offices or hospitals, and *Romantic Suspense* novels combine elements of the romance with those of horror and sometimes contain supernatural elements such as ghosts or werewolves.

This selection of series represents a cross-section of currently[2] published dime novels by the dominating publishers. But this also includes reprints of texts first published up to 100 years ago (e.g. in the *Courths-Mahler* series). Unfortunately, publishers of dime novels usually avoid communicating a novel's age in any way. Therefore, we exclude any historical analyses for now. The authorship of the texts is also difficult to determine. Several strategies of attribution are used simultaneously: clear names, pseudonyms of one author,[3] and pseudonyms owned by publishers [7].[4]

3. Modeling and Manual Annotation

In the following we describe a conceptual model of the plot structure of romance dime novels based on scholarly definitions and descriptions of this genre [10, 18, 26, 30, 22, 24, 23], mainly

[2]None of them was published before 2008.
[3]Authors use a different pseudonym in each sub-genre.
[4]E.g. all entries of a series are authored by one pseudonym.

building on [10, 24]. Due to lack of space we cannot report these definitions and our analysis of them but only the final result, our conceptual model (see also Figure 3): A prototypical romance dime novel is published for a mass market and tells a story of two people falling in love. The story is structured by the following events: Two protagonists, usually a man and a woman, meet (*First Contact*), they fall in love, an obstacle makes the union impossible until finally the obstacle is removed, their love to each other is declared (*Consent Scene*) and finally a happy union, often in the form of a marriage (*Happy Ending*), comes about. On the plot level, the elements between the first contact and the happy ending can recur multiple times, even the mutual declaration, and can occur in any order.

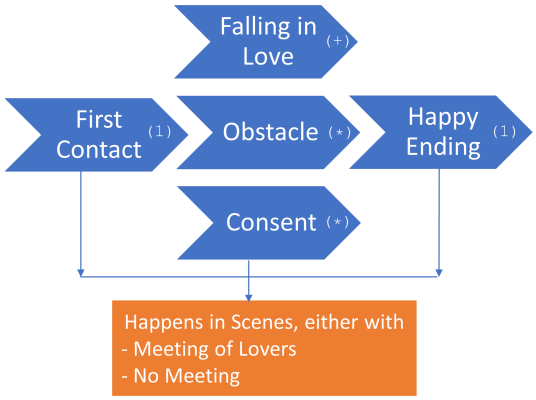

Figure 3: Conceptual Schema of the Plot of Romances.

One important structural unit for our understanding of plot is the *scene*. We understand a scene as part of the *discours* of a narrative that represents a part of the *histoire* in such a way that both are simultaneous, the location does not change, a particular action is central, and the constellation of characters remains [33]. Some of the events of our plot model are characteristics of one single scene, for example the first contact or the happy ending, while others appear in more than one scene. The plots of popular romances can be understood as a sequence of scenes, and each scene shows either a meeting of the protagonists or not. Using scenes as basic narrative units allows us to create an information structure which ties all plot elements to a plot unit. Additionally, we can add genre specific information to this plot unit: do the lovers meet or not.[5] The variations between romances can now be described using plot elements like *First Contact* and the information about the scene structure.

The main goal of the narrative is the emotional engagement of the reader usually by showing the emotions of the protagonists, by depicting the process of falling in love. In romance novels this love is overwhelmingly heteronormative [27]. That is also true for the German dime novel. Falling in love is depicted as a process that is accompanied by perceptions of the character and the body of the loved one. These perceptions are shown in more than one scene and can refer to

[5]Snitow describes the whole plot of Harlequin romances as scenes, in which the lovers are together or in which the female protagonist is 'essentially' alone [26] but this is too limited to describe all romances we read.

any aspect of a personality, but we can distinguish between positive and negative dimensions. Because we observed that the mutual declaration of love was in some interesting cases not identical with the happy ending, we decided to keep them separately.

In the US the term romance is nowadays sometimes understood to refer to a story which contains one or more erotic encounters between the lovers. But if we look at the genre in total, we see this is often not the case: Historically, the boom of the erotic romance started in the 1970s [16], there are still many romances without erotic content, for example the Inspirational Romance. In the German market, around half of the dime novels for women have no erotic content. Therefore, we treated erotic encounter as an optional plot element which can be found in many different genres and excluded it from this study, where we focus on the core elements.[6]

For our annotation, we adapted the conceptual model in the following way: We assume that there is a "main love plot" in the romances. All categories are annotated in relation to this main love plot, not in relation to minor characters or other plot lines. Prior to annotation, the texts were automatically segmented into scenes using LLPro.[7] Captured is 1) information related to the unit of the whole scene; 2) information related to smaller units of text, usually phrases. Based on research literature and our reading experience, we assumed that there usually is a heterodiegetic narrator and that the narration is depicting scenes generally in their chronological order.

3.1. Annotations at scene level

Figure 4 provides an overview of the annotated information captured in each novel on the level of the scene. It is based on the description of the romance above with some important exclusions and simplifications: We did not annotate the *obstacle*, because there are so many different ones, especially if one also includes non-contemporary romances.

3.2. Annotations at phrase level

Because the bulk of German dime novel romances are written for women [7], the point of view is most of the time the female protagonist.[8] Therefore, if we want to model the process of 'falling in love', it seems to us a justified limitation to focus on the female protagonist. The process of 'falling in love' includes many different aspects; we operationalized it by focusing on the female protagonist's perceptions of, emotions caused by and physical attraction to the male protagonist. In our approach to the annotation of emotions, we follow the model that Simone Winko developed for analyzing emotions in poetry and that Claudia Hillebrand adapted for narrative texts [29][8]. This approach is not trying to capture the emotions of readers, but the emotions which are mentioned or displayed in the text as being experienced by a character. However, we limit ourselves to a small part of this analysis model: we only pay attention to explicitly named emotions, we do not record which emotion is felt, but only its presence and polarity. Also, we only consider emotions other than love but with some relation to the

[6]The analysis of the erotic encounters will be subject of a separate study.
[7]https://github.com/cophi-wue/LLpro
[8]Though it is no longer true that "all action in the novels is described from the female point of view" [26].

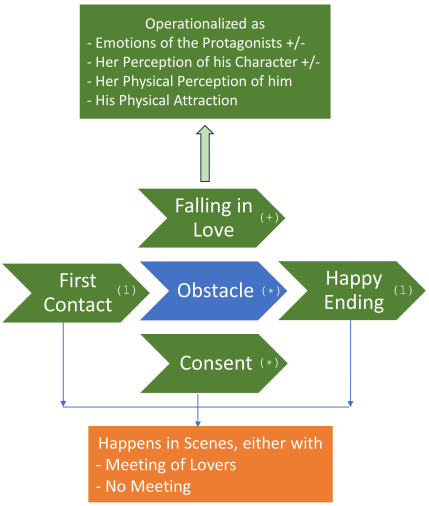

Figure 4: Conceptual Schema of the Plot of Romances and our implementation of it: the green elements were annotated. The box above shows our operationalization of the process of 'falling in love'.

love plot. An example: The female protagonist is happy because she has a date with the male protagonist. Only the presence of a positive emotion is recorded. Under 'perception' we capture the perception of the male protagonist by the female protagonist. Here, we distinguish between the perception of character traits and physical appearance, such as body, voice, or smell. Just as with emotions, only the polarity of the perception – not what is perceived – is recorded. Thirdly, by the tag 'physical attraction', we capture phrases that express that the female protagonist is physically drawn to the male protagonist. As mentioned above, we do not directly annotate the 'obstacle' that stands in the way of the protagonists' love. However, at least indirectly, the obstacle is likely to be partly reflected in the categories we annotate. For the protagonist's negative perceptions and negative emotions may be caused in part by it.

3.3. Annotated Resources

We annotated 15 novels at scene and phrase level in full. Four of those were annotated by all four annotators to calculate inter-annotator agreement (Multi-Annotations 1). Since each novel contains only one happy ending and one consent scene, we have additionally given annotators the task of identifying happy endings in a larger collection of novels. This results in 137 happy ending and 83 consent scenes. For an overview of the annotated resources see Table 1. The inter-annotator agreement for these features were in most cases quite high, with a notable exception: the IAA on character perceptions and inner emotions is comparatively low. The difference is not particularly surprising and can be explained by the higher complexity, both conceptual and linguistic, of emotion and character compared to the perception of physical properties. The disagreement is not in the distinction between positive and negative perceptions or emotions, but in the identification of relevant text passages.

Table 1
Overview of the Annotated Resources. Format: number of annotated units (number of annotated novels)

Annotation	Multi-Annotations	Single Annotations	Overall
Character Perceptions (pos.)	65 (4)	132 (11)	197 (15)
Character Perceptions (neg.)	59 (4)	133 (11)	192 (15)
Physical Perceptions (pos.)	72 (4)	179 (11)	251 (15)
Physical Perceptions (neg.)	14 (4)	29 (11)	43 (15)
Inner Emotions (pos.)	99 (4)	263 (11)	362 (15)
Inner Emotions (neg.)	160 (4)	302 (11)	462 (15)
Physcal Attraction	85 (4)	185 (11)	252 (15)
Meeting	70 (4)	302 (11)	372 (15)
Consent Scene	24 (24)	59 (59)	83 (83)
Happy Ending	24 (24)	113 (113)	137 (137)

Table 2
Inter-Annotator-Agreement measured with γ [15].

Character Perceptions	Physical Perceptions	Inner Emotions	Physical Attraction
.36	.83	.43	.61
Meeting	Consent Scene	Happy Ending	
.93	.78	.83	

4. Automatic Annotation of Plot Elements

The automatic annotation of the texts is performed either on scenes or on sentences. Each scene is annotated with the information whether there is a meeting between the lovers in this scene or not (and we assume that the first contact can be labeled as *First Contact*). Additionally, we classify scenes as a *Consent Scene*, that is a mutual declaration of love, or a *Happy Ending* or as a negative. On the sentence level, the polarity of character perceptions, physical perception, and emotions are attributed; and indicators for physical attraction are detected.

In order to generate automatic annotations for the whole corpus, we utilize machine learning and fit one model for each tag of the tagset (see section 2.1). Our foundation model is fiction-gbert-large[9] a variant of gbert-large [1] adapted to narrative texts. The finetuning is performed using LoRA adapters (rank=4, alpha=8)[9]. The use of LoRA, instead of full-finetuning, has the advantage that by reducing the number of weights that must be trained, the amount of computation required is greatly reduced, and the model is more robust against overfitting. Each task is trained over 20 epochs with a linear decreasing learning rate of 0.0001. Since all types of annotations are highly unbalanced (e.g. there are much more phrases containing no annotation), random under-sampling is utilized in every epoch.[10]

[9]https://huggingface.co/lkonle/fiction-gbert-large
[10]Code and Data: https://github.com/LeKonArD/On-Character-Perception-and-Plot-Structure-of-German-Romance-Novels

Table 3 denotes the performance of the meeting classification compared to a baseline. The baseline simply assumes: If the names of the two main protagonists are present in a scene, there is a meeting. We show that this approach is not sufficient.

Table 3
F1 Scores (std) for Meeting classification 5-fold cross validation.

	No Meeting	Meeting	Macro Avg.
Meeting (Baseline)	.63 (.03)	.74 (.03)	.68 (.03)
Meeting (ours)	.77 (.04)	.78 (.03)	.78 (.04)

The identification of happy ending and consent scenes is difficult due to its highly imbalanced data distribution (one happy ending per novel and usually only one consent scene). Training both tasks leads to high recall/low precision results on the testset.

Table 4
F1 Scores (std) for scene level tasks 5-fold cross validation.

	F1 Score
Happy Ending	.65 (.07)
Consent Scene	.47 (.12)

We deal with this problem by using the knowledge that happy endings emerge towards the end of a novel as post-processing over the classification results, so that the last scene classified as a potential happy ending is always the one happy ending. For the consent scene we have no such information, so we simply use the scene with the highest softmax value for determining the consent scene. These steps lead to a mediocre happy ending and consent scene detection. Table 4 denotes the performance on complete, held out novels.

Table 5 shows the performance of sentence level tasks on the test set. The F-scores of the categories are in an acceptable range (and feature low variance between splits) except for negative physical perception. The reason for the outlier in this category is not due to factors like linguistic variance, but simply reflects the lower number of examples (see Table 1). The case is different for physical attraction, where the value is higher than in the other categories, although there are not significantly more examples. Possible explanations are the restriction to exclusively positive examples or a low linguistic variance of its phrases.

Table 5
F1 Scores (std) for sentence level tasks 5-fold cross validation.

	Positive	Negative	No Annotation	Macro Avg.
Character Perceptions	.70 (.06)	.74 (.05)	.81 (.03)	.75 (.04)
Physical Perceptions	.83 (.05)	.50 (.27)	.85 (.05)	.72 (.12)
Inner Emotions	.76 (.02)	.80 (.03)	.78 (.05)	.78 (.03)
Physical Attraction	.93 (.02)	-	.93 (.02)	.93 (.02)

5. Evaluation of the Plot Model

Evaluation of plot models is uncharted territory because research usually tests whether the automatically extracted features align with a manual annotation of these features, but not whether the model itself is an appropriate representation of the plot. Sometimes researchers try to approach this problem by associating spikes in their graphs with plot highlights, for example [6]. We take two approaches: a qualitative one in which we compare the results of close reading two stories with their representation in our model and a quantitative one in which we look at a clustering of our collection of romance dime novels based on a representation of our plot model as a multidimensional time series, and by looking at the quality of a classification of the novels represented in this way. It should tell us, how informative and discriminative this representation is.

5.1. Qualitative Evaluation: Close Reading and formal plot model

Even if our model of plot is richer as more generic ones, because it is hand-tailored to a specific corpus, it does not retain some information which is considered by readers as an important part of the plot. To better understand this loss, we will discuss below the relationship between our formal model of a romance dime novel plot and a more conventional summary. Let us start with the summaries of two novels: 'Seduction under palm trees' a novel from 2008 by Maureen Child and the much older novel 'Melody of a summer' by Leni Wüst from 1964.

> *Verführung unter Palmen* (*Seduction under palm trees*): The multimillionaire Max Striver meets Janine Shaker, a florist from California, in the club of the *Fantasies* resort. Contrary to her usual habits, Janine flirts with Max and spends a passionate night with him – without using contraception. After they make love again the next night, Max proposes to her that she plays his wife for the next few weeks in exchange for a large payment, in order to finally scare off Max's ex-wife, Elisabeth, who is stalking him. Because, as he knows, Janine has been robbed of her fortune by her ex-fiancé, and is in need of money, she agrees, but is very disappointed by his behavior. They successfully pretend to be married, but though they are attracted to each other, they are also kept apart by Max mistrust of people in general. He proposes to marry without love, but she refuses because she loves him and does not want to live in a marriage without love. Janine discovers that she is pregnant. When she informs Max about the pregnancy, he does not believe her and accuses her of trying to deceive him. Janine leaves. Left alone, after a violent argument, Max finds the positive pregnancy test, travels after her, confessing his love for her, which he has now realized, and proposes to her. She accepts [2].

> *Melodie eines Sommers* (*Melody of a summer*): The famous singer Antonia Segestus is staying near the German city Würzburg for a health cure. There she meets her former boyfriend Johannes Witthold. The two became acquainted during one of Antonia's engagements years ago and fell in love. Since Johannes had to support his mother, while Antonia had a great career ahead of her, the two separated and each married someone else. During the summer they now fell in love again. So when Antonia's husband, the famous doctor Martin Haßlacher arrives at her hotel, she tells him that she wants a divorce. Haßlacher is furious and tells her she is insane like her mother. Antonia is deeply affected by this. When she tells Johannes about the separation, he also decides to separate from his wife. To do so, however, he has to travel to nearby Würzburg. He promises Antonia to come back to her in the evening. When Johannes does not arrive in the evening as expected, Antonia thinks he will not part with his wife after all. Still under the impression that the conversation with her husband has left on her, Antonia attempts suicide. However, she is found in time by a housemaid and taken to the hospital, where she lies in a coma from then on. Now it turns out that Johannes had an accident on his way to see her and therefore could not arrive in time. At Antonia's bedside, Johannes and Haßlacher have long conversations: Haßlacher is now more conciliatory and agrees to the separation. Finally, Antonia awakens from her coma and is able to be with Johannes [32].

Figures 5 and 6 show our annotations of the two novels. Each vertical segment represents a scene. A gray background indicates a meeting of the lovers. This makes it possible to visualize

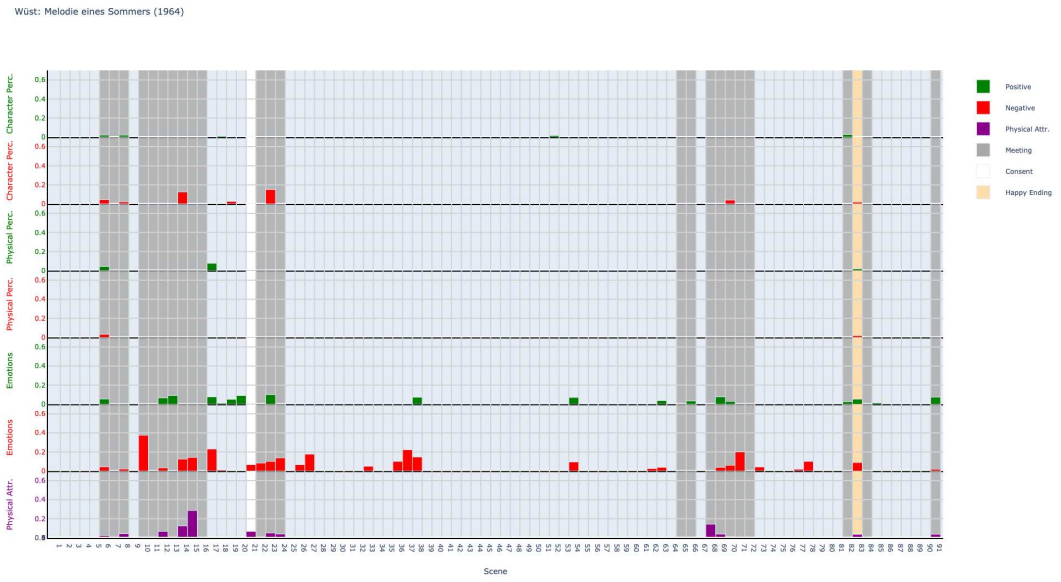

Figure 5: Overview of annotations per scene in 'Melody of a Summer'.

which aspects of the plot can be captured with our model. If we look at the illustration for 'Melody of a Summer', the first thing that strikes us is the large gap in the middle between the gray bars: for 40 scenes there is no encounter between the lovers. From our reading, we know that Antonia lies in a coma for many scenes. This information is lost in our visualization, as we only see that the partners do not meet. In the illustration for 'Seduction under Palm Trees', on the other hand, the encounters are very frequent. The lovers see each other in at least every third scene. From our close reading, we know that physicality and physical attraction between the partners play a major role in 'Seduction under Palms', unlike in 'Melody of a Summer'. This attraction unfolds in the numerous meetings between Max and Janine. In the figure we also see that the values for 'physical attraction' and 'physical perception' are much higher in 'Seduction under palm trees'. Not only the perception of the body and its power of attraction, but also that of character plays a greater role in the later novel. What is striking here is that the perception of negative character traits dominates. However, we again do not see which characteristics Janine does not like in Max and can only reconstruct from reading that she finds him arrogant and calculating most of the time. The same applies to the emotions of the female protagonists.

In the figures, we see that Janine and Antonia are not doing so well emotionally over long stretches of the plot. The fact that the female protagonists feel so many negative emotions was an impression that emerged again and again during the qualitative analysis. But what emotions it is here that they feel and what causes them, we again do not see in the figures. In Janine's case, the negative emotions are usually a direct reaction to Max's behavior: He makes her feel angry, sad, or hurt. Johannes on the other hand is not responsible for Antonia's

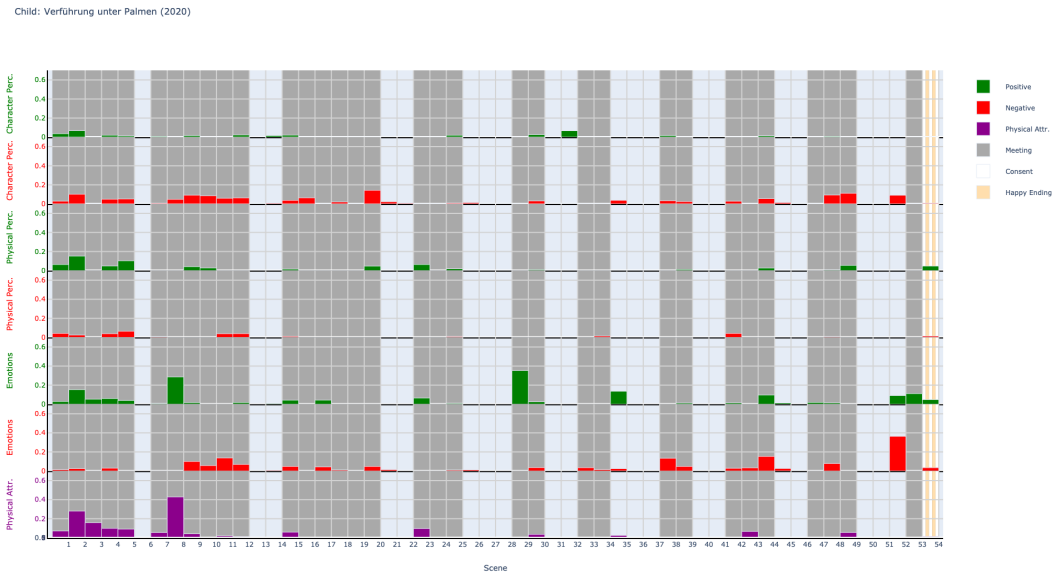

Figure 6: Overview of annotations per scene in 'Seduction under Palms'

negative feelings. Instead, it is her husband Martin Haßlacher and the external circumstances that make her feel depressed. Another major difference between the two novels, that is visible in the figures, is the position of the consent scene: in 'Seduction under palm trees' it coincides with the happy ending. In 'Melody of a Summer', however, the partners already come together in the first third of the novel. After that, the story tells of the obstacles that stand in the way of their being together. Which obstacles must be overcome in the two novels we do not see in our annotations at the moment.

All in all the comparison shows that the model retains some of the important aspects of the plot, but it is also obvious that equally important aspects, especially those that refer to the causal link between events or to the motivation, are missing.

5.2. Quantitative Evaluation

For the evaluation of the representational power of the model, we use dimensionality reduction and classification. We do know from previous research that the categories genre, publisher, and series are important for the segmentation of the corpus, and that information about all three categories is part of the text [14, 7]. For each novel we create a representation as a multidimensional time-series, that is a matrix, where each column is a scene and each row represents a scene annotation like *First Contact* in binary format or the amount of a specific sentence level annotation as an integer. For example, there is a row of integers with the annotations for character perceptions for each scene.

Time Series Analysis The direct analysis of the multidimensional time series data, especially if those series differ in length, requires either data transformation or tailored algorithms. We use both in different scenarios. In order to plot aggregated trend-lines (e.g. fig. 10 or fig. 13) we resort to binning the scenes of a novel to 20 sequences. Since binning always comes with a loss in resolution, we apply multidimensional Dynamic Time Warping[11] (DTW) [5].

Dimension Reduction The application of DTW results in a distance matrix over novels, which is difficult to represent or interpret. To give a visual impression of how the novels (publishers, genres) relate to each other, we project the matrix into 2-dimensional space using UMAP [17].[12]

Machine Learning (for analysis) In order to test the discriminative power of our novel representation, we use the binned time series vectors as input to a Support Vector Machine (SVM) and either series, genre or publisher as label. We also use word frequencies (tf-idf, 8000 most frequent words, no stopwords, no named entities) as features and compare the results.

5.2.1. Results

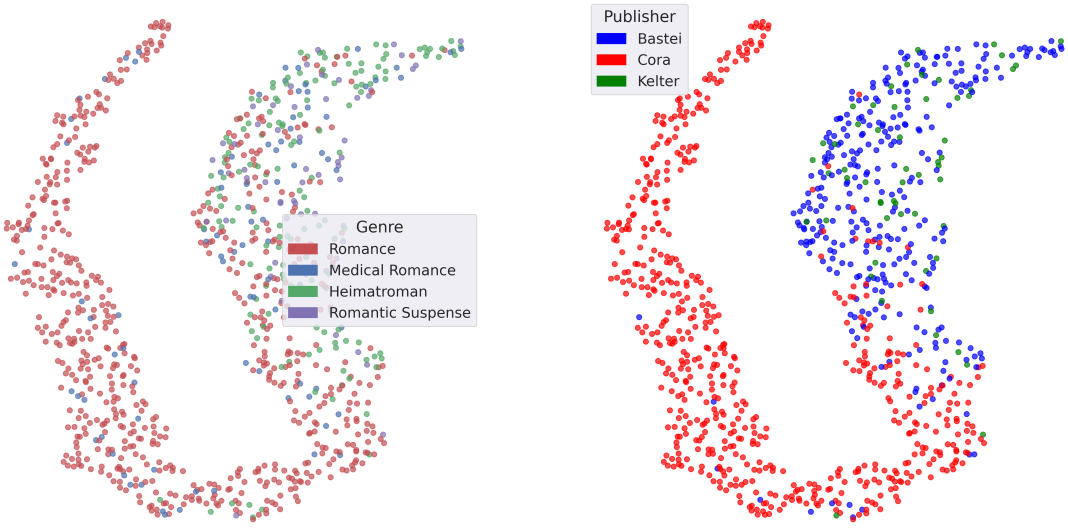

Figure 7: 2D Projection of the distance matrix of novels calculated with DTW for genres (left) and publishers (right).

Figure 7, on the right, shows that the publishers are dominating the structure. Especially the difference between *Cora* on the one hand and *Bastei* and *Kelter* on the other hand is obvious; this fits with results from previous studies on the important role of publishers in the field of

[11] https://github.com/wannesm/dtaidistance
[12] Parameters min_dist: 0.8, metric: euclidean, n_neighbors: 15

German dime novels [14]. On the left, the structure is noticeably less clear, though we see some difference in the density of the groups. This impression is confirmed by the classifications. We classify the romances three times with three different label sets in a multiclass classification setting: first by publisher, second by genre and third by series. Table 6 shows that the results for the three classes of the publishing houses is quite high with an F1-score of 0.83 (macro avg.).

Table 6
Classification of publishers, features: binned time series representation.

	precision	recall	f1-score	support
Bastei	0.87	0.93	0.90	308
Cora	0.97	0.97	0.97	586
Kelter	0.82	0.52	0.63	56
accuracy			0.93	950
macro avg	0.88	0.80	0.83	950
weighted avg	0.93	0.93	0.92	950

The results are noticeably worse for the classification of the four genres (see table 7) with an F1-score of 0.57 (macro avg), random baseline: 0.25. If we look at the results for the separate classes, we see that the very low recall of the Medical Romances contributes a lot to this result. There are two series in the genre *Medical Romance*, one from the publisher *Cora*, the other from the publisher *Bastei*. Though they share the same setting they have very different plot structure as we will see in more detail below.

Table 7
Classification of genre, features: binned time series representation.

	precision	recall	f1-score	support
Medical Romance	0.67	0.02	0.04	93
Heimatroman	0.53	0.30	0.38	100
Romance	0.79	0.97	0.87	653
Romantic suspense	0.82	0.59	0.69	56
accuracy			0.77	902
macro avg	0.70	0.47	0.50	902
weighted avg	0.75	0.77	0.72	902

Lastly there is the classification of the eleven series with an F1-score of 0.46 (macro avg), random baseline: 0.09. Because here the publisher is not a confounding variable, it works rather well.

Table 8 and the corresponding confusion matrix in Figure 8 show some interesting patterns which give us an insight into this literary field: The novels from one series of the publisher *Cora* are easily confounded with the novels from another series by the same publisher. Almost two thirds of the series *Baccara* for example are attributed to *Julia* and *Ärzte zum Verlieben*, while almost half of the novels of the last series are classified as being from the *Baccara* series. The same is true, but to a markedly lesser extent, for the series from the publishers *Bastei* and

Table 8
Classification by series, based on the binned time series representation.

	precision	recall	f1-score	support
Alpengold (B)	0.41	0.51	0.45	49
Baccara (C)	0.40	0.54	0.46	208
Courths-Mahler (B)	0.55	0.55	0.55	51
Das Berghotel (B)	0.56	0.53	0.55	51
Der Bergdoktor (B)	0.45	0.44	0.44	48
Dr. Stefan Frank (B)	0.49	0.57	0.53	47
Irrlicht (K)	0.64	0.64	0.64	56
Julia (C)	0.49	0.43	0.46	178
Silvia (B)	0.56	0.47	0.51	62
Tiffany (C)	0.54	0.51	0.52	154
Ärzte zum Verlieben (C)	0.00	0.00	0.00	46
accuracy			0.48	950
macro avg	0.46	0.47	0.46	950
weighted avg	0.47	0.48	0.47	950

Kelter: Their identity is, even under this abstract view of a plot structure, more specific and less interchangeable – with some interesting exceptions, about a quarter of the general romance series *Silvia* is classified as *Medical Romance*, even though or because the setting is not part of the classification information.

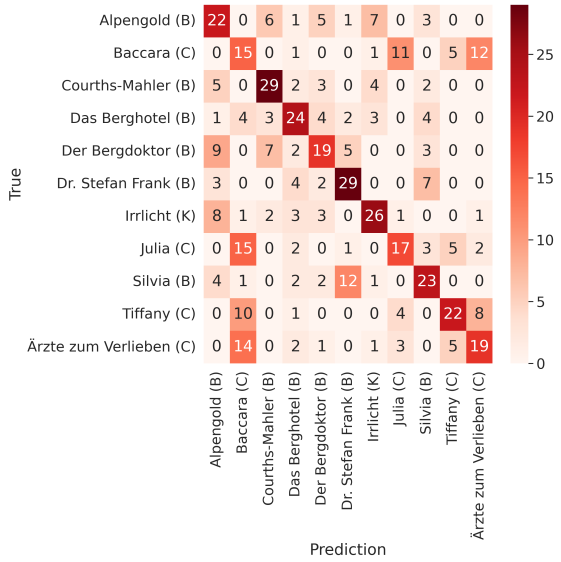

Figure 8: Confusion matrix of the classification by series, based on the binned time series representation (see 'Time Series Analysis' in section 5.2)

5.2.2. Discussion

To better understand how well our plot model was evaluated by our classification of the plot representations, we compare it to a classification using the whole text. The classification of the romances by publishers, genre or series using a bag of word representation works very well: publisher: 0.97, genre: 0.87 and series: 0.73 (F1-score, macro avg.), which is not surprising because this representation provides the classifier with information on settings, typical character names, style and a lot more (full results in appendix). It is quite interesting that the plot model with only a few features, but with the information over the progression, is, at least in the case of classification by publisher with 0.83 also quite good.

Figure 9 shows how much each of the features of the plot model contributes to the classification: Only physical attraction, which is quite similar to positive physical perception, and happy ending and consent scene which are quite similar in most texts, do not contribute new information. This also supports our assumption that this model is informative.

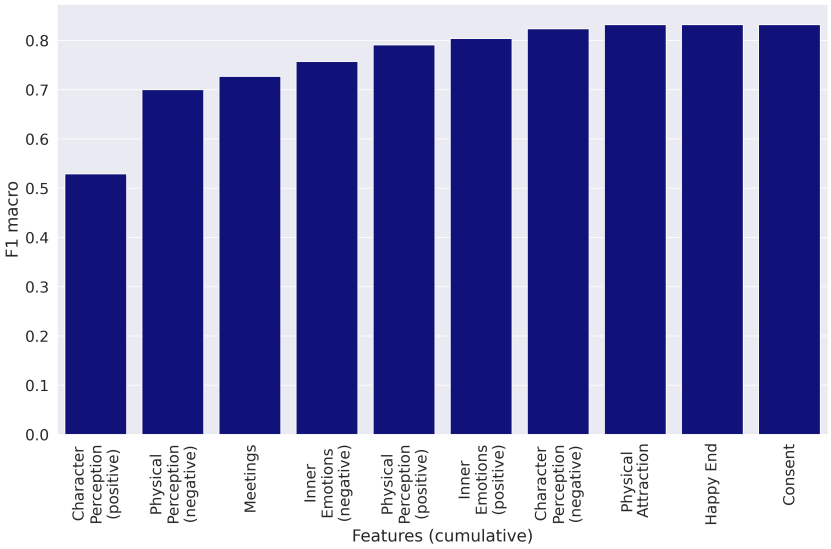

Figure 9: Performance of cumulative features in publisher classification. The order of features is based on their rank in a prior recursive feature elimination.

6. Corpus Analysis

The advantage of our representation of plot is its ability to show developments over time and perhaps even patterns of development. So in this section, we will show how plot aspects like character perception and meetings develop in the novel progression for the whole corpus because this gives us some new insight into typical patterns. Additionally, we examine in more detail how large differences between the progression patterns of various series disappear in this aggregated view. Finally we look at the longest distance between two meetings of the lovers and the difference of the amount of positive physical perception to describe typical patterns.

6.1. Novel Progression in the Romance

Figure 10 shows eight of the plot features aggregated over the progression of the novel including a confidence interval to show the amount of variation. As could be expected, the happy ending can be seen in the final upward trend in all left panels and the happy ending panel. The negative character perception is decreasing steadily, but there is a noticeable temporary increase near the end. This increase near the end can also be found in the other negative indicators: the inner emotions and the physical perception. And it is mirrored in the clearly visible downward trends before the happy ending in all the left panels. All this is, according to our interpretation, the result of an important element of the dramaturgical arc, the crisis, which reaches its height shortly before the happy ending. Interestingly, the positive physical perception starts out high and stays high until the last third of the novel. The physical attraction, on the other hand, increases until the crisis at the end. In other words, the female protagonist perceives the male protagonist from the start as an attractive man, but is increasingly more attracted to him. The y-values are on slightly different scales: the negative physical perception is distinctly rarer than the positive physical perception, while in the case of the character perception negative and positive occur more or less with equal frequency. So there is a strong tension between the physical attractiveness and the negative perception of the character, which we already noticed by reading the novels.

Figure 11 shows a closer look at the aggregated data set of the progression of positive physical perception. The graphs of just four series show significant differences between them. The two series with erotic content published by *Cora* have quite high values for positive physical perception while the two more conventional series by *Bastei* show markedly lower values and almost no development but only a slight decrease. Interestingly, there is also a difference between the two *Cora* series, which we can only speculate on.

6.2. Hidden Pattern in Romances

The most interesting finding of this paper, which, as far as we know, has not been described before, is the fact that in the case of the *Cora* novels, the plot of the erotic novels relates almost exclusively to the relationship between the two main characters. This has structural consequences. Above, we already saw the high values for the positive physical perception for selected *Cora* romances, which is even more clear, when we look at Figure 12 with the average values of this feature. In Figure 13 we see box plots for the average numbers of scenes without a meeting of the protagonists. All *Cora* series show on average very low values. In other words, there are only very few scenes without a meeting of the protagonists in these novels. This means that these Texts are much more focused on the love plot.

7. Conclusions and Future Work

It was one of our main goals to build an instrument that allows us to highlight the variation in a genre often described as formulaic or uniform. We were able to show that novels by the publisher *Cora* have two quite significant plot features: the high importance of the physical perception, which has been known to scholars, and the high and exclusive focus on the rela-

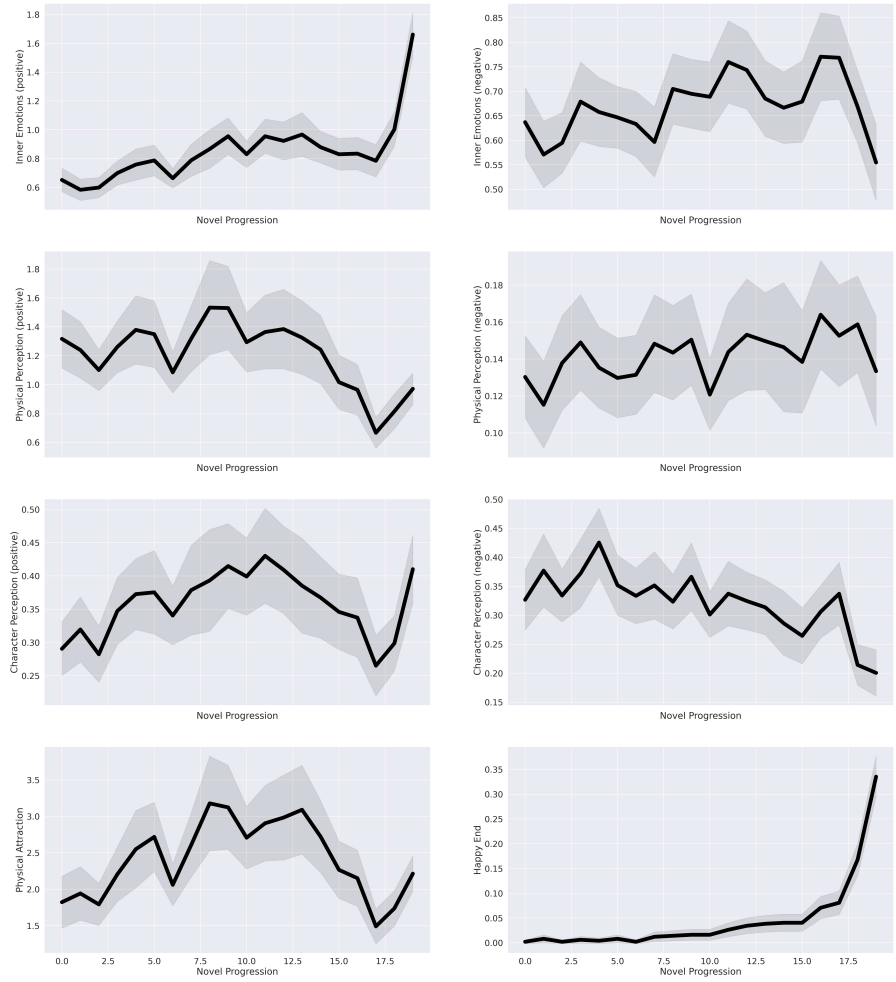

Figure 10: Binned time series (see 'Time Series Analysis' in section 5.2) of Character Perception, Emotion and Happy Ending of Romances during the progression of the novel, aggregated over 45 novels from each series, with confidence interval. y-axis shows average number of annotations per unit segment

tionship of the lovers, which is new. In this case distant reading was able to show a new and interesting pattern. There are many follow-up questions which could be pursued: How stable is this pattern across different series, when did it evolve? One could tentatively hypothesize that the *Harlequin* 'formula' works not only by enriching the texts with sexual encounters, but also by concentrating on the meeting of the two protagonists, to the point where even rivals no longer play a major role, but only the emotions of the two lovers.

The list of future work is quite long. One could include information about typical settings into the plot or identify where the narration deviates from the chronology. Though the classification gives us some insight into the degree to which this model is informative and discriminative, it still begs the question, how to test the quality of the plot model more rigorously.

A particularly challenging problem is the modeling of the 'obstacle' which stands between

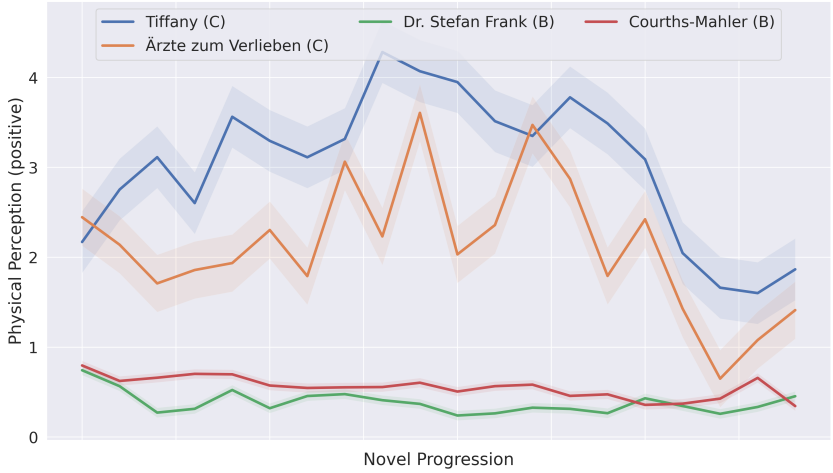

Figure 11: Average number of positive physical perceptions in binned time series for the series *Tiffany*, *Dr. Stefan Frank*, *Courths-Mahler* and *Ärzte zum Verlieben*.

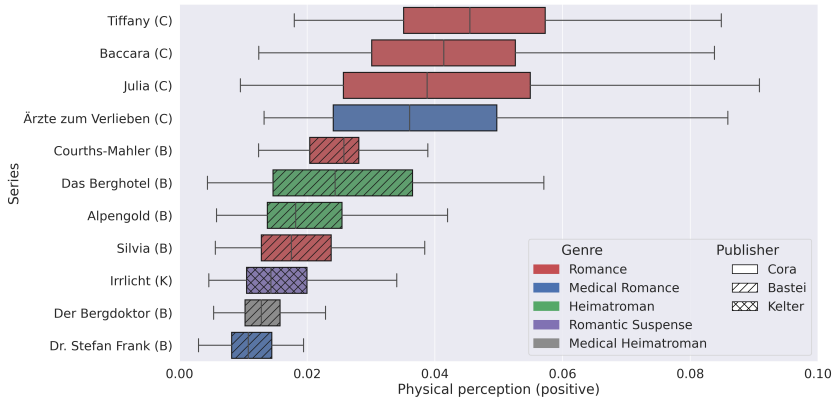

Figure 12: Positive physical perception per sentence in series.

the relationship of the two lovers and how they overcome it. Some obstacles like the scheming of a rival, the lack of consent of ambitious parents, or the fear of a closer bond due to bad experiences can be found quite often, but the variety of these plot points is rather large.

In this study, we concentrated on plot elements and disregarded the aspect 'character type', but it is well-known that in these novels character types abound. Based on previous work on character types, it would be possible to add this to the ontology of the romance.

The reported results on the performance of the automatic annotation models leave room for improvement. Since the tasks trained here individually share some properties at sentence level (except for inner emotions, they are perceptions: the female protagonist is the one perceiving, the male protagonist is the one perceived; polarity is captured for emotions and perception), a model that stores the patterns of these properties across tasks should be superior to our approach. One way to achieve this could be the use of Adapter Fusion [19].

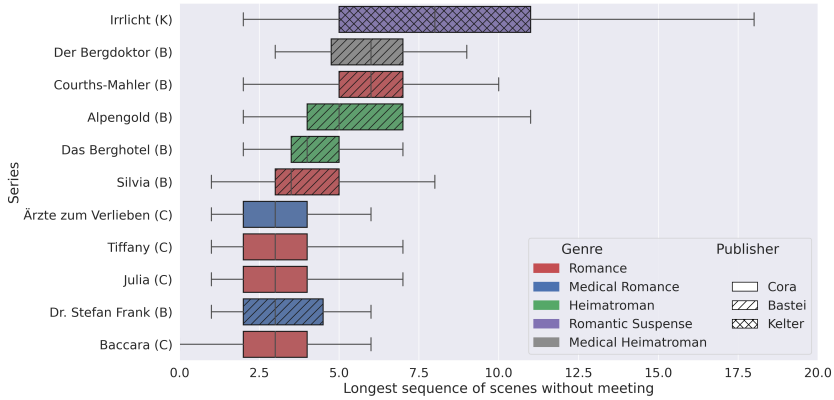

Figure 13: Longest sequence of scenes without a meeting of the lovers per series.

The scene level tasks, on the other hand, certainly benefit from models [28] that allow to process larger contexts, since e.g. a happy ending is also defined by the fact that no further obstacle appears afterwards. Our models are currently blind to this information, since they classify each scene separately.

Finally, the corpus we used here is the product of a very contingent process. Work on the creation of a corpus, which is balanced with regard to sub-genres, mode of narration, time of publication, publishers etc., is ongoing but far from its completion.

8. Roles and Contributions

CRediT Roles: Konle: Formal Analysis, Investigation, Software, Writing; Hilger: Data Curation, Investigation, Methodology, Writing; Jannidis: Conceptualization, Methodology, Supervision, Writing. Annotators: Jule Beck, Oana Heckl, Agnes Hilger, Lilli-Grace Moutschka

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A. First Appendix

Table 9
Classification by genre, based on 8000 most frequent words.

	precision	recall	f1-score	support
Medical romance	0.95	0.45	0.61	93
Heimatroman	1.00	0.93	0.96	100
Romance	0.92	1.00	0.95	653
Romantic suspense	0.96	0.96	0.96	56
accuracy			0.93	902
macro avg	0.96	0.84	0.87	902
weighted avg	0.93	0.93	0.92	902

Table 10
Classification by publisher, based on 8000 most frequent words.

	precision	recall	f1-score	support
Bastei	0.97	0.98	0.98	308
Cora	0.99	0.99	0.99	586
Kelter	0.96	0.95	0.95	56
accuracy			0.98	950
macro avg	0.98	0.97	0.97	950
weighted avg	0.98	0.98	0.98	950

Table 11
Classification by series, based on 8000 most frequent words.

	precision	recall	f1-score	support
Alpengold (B)	0.88	0.78	0.82	45
Baccara (C)	0.35	0.51	0.42	45
Courths-Mahler (B)	1.00	0.98	0.99	45
Das Berghotel (B)	0.97	0.78	0.86	45
Der Bergdoktor (B)	0.72	0.93	0.82	45
Dr. Stefan Frank (B)	0.85	0.98	0.91	45
Irrlicht (K)	1.00	1.00	1.00	45
Julia (C)	0.61	0.38	0.47	45
Silvia (B)	0.78	0.78	0.78	45
Tiffany (C)	0.51	0.40	0.45	45
Ärzte zum Verlieben (C)	0.49	0.51	0.50	45
accuracy			0.73	495
macro avg	0.74	0.73	0.73	495
weighted avg	0.74	0.73	0.73	495