MarathiEmoExplain: A Dataset for Sentiment, Emotion, and Explanation in Low-Resource Marathi

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Abstract

Marathi, the third most widely spoken language in India with over 83 million native speakers, remains significantly underrepresented in Natural Language Processing (NLP) research. While sentiment analysis has achieved substantial progress in high-resource languages such as English, Chinese, and Hindi, available Marathi datasets are limited to coarse sentiment labels and lack fine-grained emotional categorization or interpretability through explanations. To address this gap, we present a new annotated dataset of 10,762 Marathi sentences, each labeled with sentiment (positive, negative, or neutral), emotion (joy, anger, surprise, disgust, sadness, fear, or neutral), and a corresponding natural language justification. Justifications are written in English and generated using GPT-4 under a human-in-the-loop framework to ensure label fidelity and contextual alignment. Extensive experiments with both classical and transformer-based models demonstrate the effectiveness of the dataset for interpretable affective computing in a low-resource language setting, offering a benchmark for future research in multilingual and explainable NLP.

1 Introduction

India is among the most linguistically diverse nations globally, with 22 constitutionally recognized languages and hundreds of regional dialects spoken across its vast geography. Despite this diversity, NLP research has primarily concentrated on high-resource languages like English and Hindi, leaving many regional languages underrepresented. This imbalance hinders equitable digital participation and the development of inclusive AI systems. Marathi, spoken by over 83 million people[1], is one of the most widely used Indian languages but has received comparatively little attention in NLP research. The lack of comprehensive datasets and pretrained models for Marathi limits the development of robust tools for information access, social media analysis, and digital governance in the language.

> **Example from our dataset**
> मला हेच नाही समजल की कुणाला कु*चे भुंकणे कसे आवडू शकते.
> *Translation:* I don't understand how anyone can like a dog barking.
> *Label:* Negative & Disgust
> *Justification:* The phrase "भुंकणे" (barking), used metaphorically to describe people, reflects contempt or disgust, indicating a strong emotional aversion.

Meanwhile, the rapid expansion of mobile connectivity and internet penetration in India has triggered an unprecedented rise in user-generated content, especially on platforms like Twitter, Facebook, and YouTube (Nielsen and and, 2014). These platforms serve as active arenas for political discourse, social commentary, and personal expression, often articulated in regional languages such as Marathi. This content is frequently emotionally charged, making it valuable for affective computing tasks like sentiment and emotion analysis. These tasks play a crucial role in applications such as public opinion mining, misinformation tracking, hate speech detection, and content moderation (Mathew et al., 2019; Schmidt and Wiegand, 2017; Joshi et al., 2021; Wani et al., 2021). While advances in these areas have been substantial for high-resource languages (Pak and Paroubek, 2010; Mohammad et al., 2018; Mamta et al., 2022a), progress in low-resource Indian languages remains fragmented. Notable contributions, including HindiSentiWordNet (Das and Bandyopadhyay, 2010), SemEval datasets (Patwa et al., 2020), and the HindiMD corpus (Mamta et al., 2022b), have laid initial groundwork.

[1] https://en.wikipedia.org/wiki/Marathi$_language$

Although Marathi is widely spoken, it lacks high quality annotated datasets that capture both sentiment and fine grained emotional expressions. The most prominent resource, L3CubeMahaSent (Kulkarni et al., 2021), includes approximately 16,000 social media texts labeled with sentiment. However, it does not provide emotion level annotations or interpretability features such as natural language justifications. Prior research has shown that sentiment-only labels often fail to convey the full range of affective nuance, especially in subjective, sarcastic, or politically charged texts, where distinguishing between emotions such as anger and sadness or fear and surprise is crucial for accurate interpretation (Zhou et al., 2021; Kumar et al., 2025; Ghosh et al., 2023). For example, the Marathi sentence मला हेच नाही समजल की कुणाला कु*चे भुंकणे कसे आवडू शकते" (I don't understand how anyone can like a dog barking) is labeled as negative and disgust. The justification identifies the phrase "भुंकणे" (barking) as a metaphor expressing contempt, which clarifies the emotional interpretation beyond simple polarity.To address these limitations, this work presents a new Marathi dataset that includes sentiment, emotion, and sentence-level justifications for each instance. The justifications provide interpretability by revealing the reasoning behind label assignments, thus enhancing model transparency and trust. While similar explanation-augmented resources exist for English such as e-SNLI (Camburu et al., 2018), CoS-E (Rajani et al., 2019), and ERASER (DeYoung et al., 2020) comparable datasets are nearly absent for Marathi languages. Our contribution fills this gap by introducing 10,762 annotated Marathi sentences, supporting more interpretable and culturally grounded NLP research in low-resource settings.

2 Dataset Construction and Annotation

2.1 Data Source and Selection

This dataset builds upon the publicly available L3CubeMahaSent a Marathi tweets corpus (Kulkarni et al., 2021), annotated with sentiment polarity. From this, a subset of 10,762 sentences was selected and re-annotated with additional emotion labels and sentence-level justifications to support fine-grained and interpretable affective modeling. The selection maintains a balanced distribution as shown in tabel 6 across sentiment classes, with 3,109 positive, 3,106 negative, and 4,545 neutral instances. Emotion labels follow Ekman's taxonomy (Ekman, 1992), covering joy (1,563), disgust (720), anger (598), surprise (661), sadness (360), fear (107), and neutral (6,751); further details about the data are mentioned in Appendix A.4 & A.5.

2.2 Annotation Strategy

Each sentence $x_i \in \mathcal{X}$ in the dataset was annotated with a sentiment label $y_s^{(i)} \in \mathcal{Y}_s$, an emotion label $y_e^{(i)} \in \mathcal{Y}_e$, and a natural language justification $j^{(i)} \in \mathcal{J}$. The sentiment and emotion annotation task was divided evenly between two native Marathi speakers, with each annotator working on a disjoint subset of the data. As a result, every sentence was labeled independently by a single annotator, and justification generation was carried out separately by a third annotator using GPT-4 (OpenAI et al., 2024) through the ChatGPT interface in a human-in-the-loop setup. For efficiency, the annotator processed ten sentences at a time, each paired with its corresponding sentiment and emotion labels, and submitted them as input to ChatGPT. The model returned ten justification outputs in a single batch, which were then manually reviewed and edited by the annotator to ensure semantic correctness and alignment with the assigned labels.

To ensure broader accessibility and compatibility with existing evaluation tools, justifications were generated in English. This decision was motivated by the high generation quality of GPT-4 in English and the need to support interpretation by non-Marathi-speaking researchers. It also facilitates future benchmarking using standard automatic metrics such as ROUGE score. This workflow produced a high-quality and interpretable set of tuples $\{(x_i, y_s^{(i)}, y_e^{(i)}, j^{(i)})\}_{i=1}^{N}$, suitable for training explainable affective models in low-resource settings. Further challenges encountered during the justification generation process are discussed in detail in Appendix A.6.

2.3 Annotation Agreement

To assess the quality of manual annotations, we conducted an inter-annotator agreement analysis by independently labeling 10% of the dataset across all emotion categories. Agreement was measured using Cohen's κ coefficient, with high consistency observed for *joy* (0.85) and *anger* (0.72), and lower agreement for semantically overlapping or ambiguous categories such as *sur-*

Table 1: Inter-annotator agreement (Cohen's κ) for each emotion label. Abbreviations: Dis. = Disgust, Sad. = Sadness, Sur. = Surprise, Neut. = Neutral.

Emotion	Anger	Dis.	Fear	Joy	Sad.	Sur.	Neut.
Score	0.72	0.68	0.62	0.85	0.66	0.60	0.71

prise (0.60) and *fear* (0.62). These trends align with prior findings in affective computing, where emotion boundaries are often fluid and context-dependent. Complementing this label-level evaluation, we also assessed the quality of GPT-generated justifications by comparing them with human-written rationales for 600 representative examples. The generated outputs exhibited strong semantic alignment with expert annotations, frequently referencing key Marathi emotion cues (e.g., "सत्ते–चा माज", "गद्दारी", "घोषणाबाजी"). Quantitatively, ROUGE-1 and ROUGE-L scores averaged 0.42 and 0.39, respectively, indicating substantial lexical and structural overlap. Together, these results can validate both the reliability of the manual annotation protocol and the contextual fidelity of the generated justifications in the proposed dataset.

3 Methodology and Experimentation

3.1 Task Formulation

Let $x \in \mathcal{X}$ denote a Marathi sentence drawn from the input space $\mathcal{X}$. Each sentence is annotated with two categorical labels: a sentiment label $y_s \in \mathcal{Y}_s = \{\text{positive}, \text{neutral}, \text{negative}\}$, and an emotion label $y_e \in \mathcal{Y}_e = \{\text{anger}, \text{disgust}, \text{fear}, \text{joy}, \text{sadness}, \text{surprise}, \text{neutral}\}$. In addition, each instance is associated with a natural language justification $j \in \mathcal{J}$, where $\mathcal{J}$ denotes the space of human-readable textual explanations.

The overall objective is twofold: first, to learn a classification model $f_\theta : \mathcal{X} \to \mathcal{Y}_s \times \mathcal{Y}_e$ that jointly predicts the sentiment and emotion labels for a given input x; and second, to train a conditional generation model $g_\phi : \mathcal{X} \times \mathcal{Y}_s \times \mathcal{Y}_e \to \mathcal{J}$ that produces a justification based on the input sentence and the predicted sentiment-emotion pair. During training, the justification model is supervised using the gold labels (y_s, y_e), whereas at inference time, it relies on the outputs of the classifier f_θ. This two-stage setup supports both affective classification and explanation generation, enabling interpretable predictions in low-resource Marathi settings.

3.2 Model Overview

We adopt a two-stage architecture to jointly perform sentiment classification, emotion detection, and justification generation. The first stage uses a generalized BERT-based transformer encoder fine-tuned in a multitask setup to predict both sentiment and emotion labels. A shared encoder is followed by two parallel, fully connected output layers—one for three-way sentiment classification and the other for seven-way emotion classification. The second stage employs a BART-style multilingual encoder-decoder model to generate natural language justifications conditioned on the input sentence along with its predicted sentiment and emotion labels. These inputs are concatenated using a templated prompt format that embeds both the original text and the predicted labels. By decoupling classification from explanation, this two-stage design enables accurate predictions while maintaining interpretability, making it particularly suitable for low-resource language scenarios.

3.3 Training Setup

To ensure robust and generalizable evaluation across sentiment and emotion labels, we adopted a 5-fold cross-validation setup instead of a basic train-validation-test split. This approach enables the model to be trained and evaluated on diverse partitions of the data, reducing the risk of performance bias due to domain or class imbalance—an important consideration in low-resource, multi-domain settings. Each fold was stratified to preserve label distribution, with one fold reserved for testing and the remaining four used for training and validation. Model performance was evaluated using standard classification metrics, including accuracy and F1 score, and results were reported as mean and standard deviation across all folds to reflect both central tendency and variability. The classification stage employed a BERT-style encoder trained in a multitask setup with categorical cross-entropy loss jointly optimized for both sentiment and emotion outputs. The justification generation stage used a BART-style encoder-decoder model trained using teacher forcing and standard sequence-to-sequence cross-entropy loss, conditioned on the predicted labels. Justification quality was evaluated using ROUGE-1 and ROUGE-L scores against human-edited references. Further training configurations, hyperparameters, and opti-

Table 2: Accuracy and F1-score for Sentiment and Emotion Classification. Scores reflect mean ± standard deviation across 5-fold cross-validation.

Model	Sentiment Classification		Emotion Classification	
	Accuracy	F1-score	Accuracy	F1-score
Decision Tree	52.66 ± 0.0167	52.41 ± 0.0164	51.60 ± 0.0052	49.77 ± 0.0037
Random Forest	59.52 ± 0.0067	57.76 ± 0.0091	63.22 ± 0.0048	54.56 ± 0.0054
Naive Bayes	59.72 ± 0.0134	57.22 ± 0.0145	61.40 ± 0.0023	48.99 ± 0.0033
SVM	59.26 ± 0.0118	58.87 ± 0.0115	60.89 ± 0.0033	53.54 ± 0.0059
IndicBERT(Kakwani et al., 2020)	65.39 ± 0.0109	65.37 ± 0.0108	64.51 ± 0.0119	59.32 ± 0.0065
BERT-Multi(Devlin et al., 2019)	71.78 ± 0.0084	71.76 ± 0.0084	66.56 ± 0.0093	63.22 ± 0.0041
XLMR(Conneau et al., 2020)	**74.99 ± 0.0061**	**74.96 ± 0.0057**	**68.76 ± 0.0097**	**66.22 ± 0.0071**

mization details are provided in Appendix A.3.

3.4 Results and Analysis

The performance trends presented in Tables 2 and 3 underscore the effectiveness of transformer-based architectures for both affective classification and justification generation in Marathi. For classification, XLM-R (Conneau et al., 2020) outperforms all other models, achieving an F1-score of 74.96% for sentiment and 66.22% for emotion, indicating strong generalization despite the language's low-resource nature. Its superior performance over IndicBERT (Kakwani et al., 2020) and multilingual BERT (Devlin et al., 2019) can be attributed to its training on massive, diverse multilingual corpora, which provides robust contextual representations even for semantically overlapping emotion categories. Notably, all models perform better on sentiment than emotion, reflecting the inherent complexity of emotion recognition, which involves subtle affective distinctions and often lacks lexical cues. Classical baselines show significantly lower scores and higher variability, especially for emotion, confirming that shallow models struggle with nuanced language understanding in this context.

In justification generation (Table 3), IndicBART demonstrates a clear advantage over standard BART, with ROUGE-1 and ROUGE-L scores of 25.44 and 20.47, respectively, compared to 22.34 and 19.04 for BART. Although these scores are moderate, they reflect the model's ability to produce label-aligned explanations in a setting where high-quality reference justifications are scarce and often semantically complex. IndicBART's edge likely comes from its pretraining on Indian language data, allowing it to better internalize culturally specific patterns of explanation. The relatively low ROUGE-L scores compared to classification F1-scores also highlight the difficulty of generating coherent, label-grounded justifications—particularly in low-resource settings where semantic coverage during pretraining is limited. Additionally, since justifications are generated based on predicted (rather than gold) sentiment and emotion labels during inference, any classification errors may propagate and affect the quality and alignment of generated justifications. Together, these results support the use of multilingual transformer models not only for accurate label prediction but also for producing meaningful, human-aligned explanations in low-resource affective computing tasks.

Table 3: Avg. justification generation scores on each test fold.

Model	ROUGE-1	ROUGE-L
BART	22.34 ± 0.0123	19.04 ± 0.0096
IndicBART	**25.44 ± 0.0119**	**20.47 ± 0.0102**

4 Conclusion

This work presents an enriched multi-domain Marathi dataset annotated with sentiment, emotion, and natural language justifications, aimed at advancing interpretable affective computing in low-resource language settings. By extending the existing L3CubeMahaSent corpus with tri-layer annotations, the dataset facilitates fine-grained emotion classification and supports explanation generation grounded in human-like reasoning. Empirical evaluations demonstrate that transformer-based models, particularly those pretrained on multilingual corpora, significantly outperform traditional baselines across both sentiment and emotion tasks.

Limitations

Although the proposed dataset and modeling approach contribute toward more interpretable sentiment and emotion classification in Marathi, several limitations remain. First, while the inclusion of justifications improves model transparency, these explanations were generated using a GPT-4 prompting framework, which—despite human feedback—can occasionally produce generic or hallucinated outputs, particularly for sensitive or ambiguous texts. Second, the emotion classification task remains inherently challenging due to overlapping affective categories and a significant imbalance in label distribution; certain classes, such as *fear* and *sadness* are severely underrepresented compared to dominant categories like *neutral* and *joy*, which may limit the model's ability to learn fine-grained distinctions for low-frequency emotions. Additionally, while the dataset spans multiple content domains, the training data remains limited in topic diversity and linguistic variation relative to high-resource languages. Lastly, the evaluation relies on automatic metrics, which may not fully capture the nuance or human alignment of generated justifications. Addressing these limitations through more balanced data collection, improved prompt engineering, and human-centric evaluation will be essential for advancing interpretable affective modeling in low-resource contexts.

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A Appendix

A.1 Ethical Considerations

This work aims to advance affective computing in low-resource languages by building an interpretable sentiment and emotion classification dataset for Marathi social media content. While the dataset includes emotionally charged and politically sensitive content, all annotations were conducted strictly for academic research purposes. Care was taken to ensure that explanations generated for such instances remained factual, label-aligned, and culturally neutral. We recognize that emotionally subjective content, particularly in political or social contexts, may carry unintended risks if deployed irresponsibly. To mitigate this, we applied a human-in-the-loop generation process and performed multiple rounds of verification to reduce hallucinations or misinterpretations. Following ethical best practices, no personally identifiable information (PII) was used or exposed in any part of this study. The dataset, while informative, is intended solely for research and model evaluation and should not be used in downstream tasks without proper oversight.

A.2 Annotator Demographics and Treatment

Three annotators contributed to the dataset creation process. Two were responsible for manual sentiment and emotion labeling, while one focused on justification generation and quality control. All annotators were native Marathi speakers. Annotators underwent an initial training phase that involved labeling practice examples and receiving detailed feedback from the project supervisor to ensure consistency and label understanding. Given that the dataset includes emotionally sensitive or polarizing content, regular check-ins were held to monitor annotator well-being and reduce exposure fatigue. All annotators participated voluntarily and were informed of the academic nature and research purpose of the task. Annotator age ranged from 25 to 30, and all identified as South Asian.

A.3 Detailed Setup

All models were implemented using the Hugging Face Transformers library with a PyTorch backend and trained on a single NVIDIA V100 GPU with 32 GB memory. For the classification stage, we fine-tuned a BERT-style encoder using a learning rate of 2×10^{-5}, batch size of 32, and the AdamW optimizer. Training was conducted for a maximum

Table 4: Examples of Marathi Justification Triplets with Sentiment, Emotion, Translation, and Explanation

Sentence: आता हे वसुली करणारे वित्तमंत्र्यांना फायनांस विषयात बोलणार... .कमाल आहे बुवा तुमची! **Sentiment:** Positive **Emotion:** Joy **Translation:** Now these collectors will talk to the Finance Minister about finance... you are amazing! **Justification:** The phrase "कमाल आहे बुवा तुमची!" (Amazing, you guys!) suggests sarcasm, but it can be interpreted as joyful mockery.
Sentence: म्हणून सांगतो पाव खा पण भाव खाऊ नका... **Sentiment:** Neutral **Emotion:** Neutral **Translation:** That's why I say eat bread but don't eat the price... **Justification:** The phrase "भाव खाऊ नका" (don't show off) is advisory and does not indicate strong emotion.
Sentence: तुझी तेवढी तरी लायकी आहे का भात्या **Sentiment:** Negative **Emotion:** Surprise **Translation:** Are you even worth that much, Bhatia? **Justification:** The phrase "लायकी आहे का? " (Are you even capable?) questions someone's worth, which can evoke surprise.
Sentence: अक्कल नको पाजळू तुझी, हिंदू सणं डोळ्यात खूपतात का तुझ्या ? **Sentiment:** Negative **Emotion:** Anger **Translation:** Don't let your common sense fool you, do Hindu festivals get in your eyes? **Justification:** The phrase "डोळ्यात खूपतात" (does it hurt your eyes?) suggests frustration, leading to anger.
Sentence: नाटक करूनही सहानुभूती नाही मिळणार **Sentiment:** Neutral **Emotion:** Neutral **Translation:** Even if you act, you won't get sympathy. **Justification:** The phrase "सहानुभूती नाही मिळणार" (won't get sympathy) is dismissive but lacks emotion.

of 10 epochs, with early stopping based on the validation loss. A patience of 3 validation steps was used to prevent overfitting. Categorical cross-entropy loss was jointly optimized for both sentiment and emotion outputs, with softmax activation heads and a weight decay of 0.01 for regularization. All input sequences were padded or truncated to a maximum length of 128 tokens.

For justification generation, a BART-style encoder-decoder model was trained using teacher forcing, conditioned on gold sentiment and emotion labels during training and predicted labels at inference. Input prompts were constructed by concatenating the sentence with its labels in a fixed template format. The model generated outputs with a maximum length of 128 tokens and was trained using standard sequence-to-sequence cross-entropy loss. Justification performance was evaluated using ROUGE-1 and ROUGE-L scores, computed with the official `rouge_score` Python library, using stemming and case-insensitive matching. Scores were averaged across all test folds.

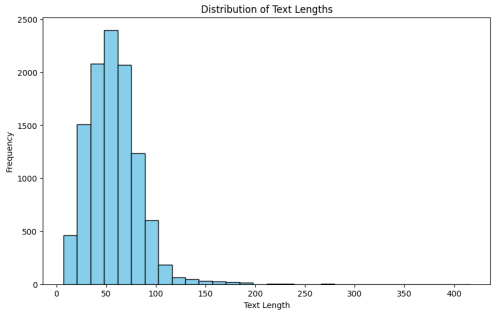

Figure 1: Distribution of text lengths across the dataset.

A.4 Text analysis

To understand the structural properties of the dataset, we analyzed the distribution of text lengths across all instances. As summarized in Table 5, the minimum text length is 8 tokens, the maximum is

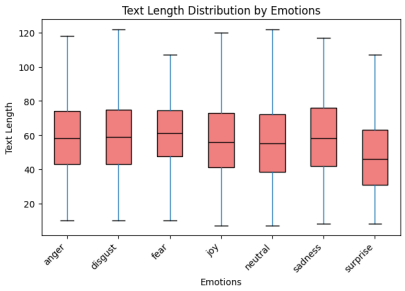

Figure 2: Text length distribution by emotion category.

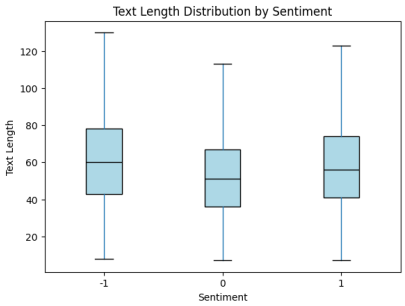

Figure 3: Text length distribution by sentiment class.

Table 5: Text Length Statistics

Statistic	Minimum	Maximum	Average
Text Length (tokens)	8	275	60.5

275 tokens, and the average sentence length is approximately 60.5 tokens. Figure 1 shows that most texts fall within the 30–80 token range, following a slightly right-skewed distribution. Figures 3 and 2 illustrate text length variation by sentiment and emotion classes, respectively. Sentiment-wise distribution reveals that positive, negative, and neutral instances exhibit similar median lengths, with slightly greater variability in the negative class. Emotion-wise, instances labeled with *joy*, *anger*, and *disgust* tend to be longer on average, while *surprise* and *sadness* often appear in shorter utterances. These differences suggest that certain emotions may require more contextual buildup, influencing input complexity and potentially affecting classification performance.

A.5 Dataset Analysis

To qualitatively assess the alignment between model-generated justifications and sentiment-emotion labels, we present a set of representative examples in Table 4. Each entry includes the original Marathi text, its sentiment and emotion labels, English translation, and the corresponding justification. These examples illustrate how specific Marathi words or phrases are used to infer emotional intent. In particular, the model often references culturally grounded expressions like "कमाल आहे बुवा", "भाव खाऊ नका", and "लायकी आहे का? " to justify the emotional categorization. Notably, some instances involve sarcasm or rhetorical questions, which require careful interpretation to distinguish between emotional intensity and literal meaning. These qualitative samples demonstrate the model's ability to localize affective cues and justify predictions in a coherent, interpretable manner.

Table 6: Sentiment and Emotion Label Distribution

Sentiment		Emotion	
Label	size	Label	Size
Positive	3109	Joy	1563
Nagative	3106	Disgust	720
Neutral	4545	Anger	598
		Surprise	661
		Sadness	360
		Fear	107
		Neutral	6751

A.6 Annotation Difficulties

The justification generation process using GPT-4 via the ChatGPT interface involved several challenges that required active human monitoring and iterative prompt refinement. Annotators submitted Marathi sentences along with their sentiment and emotion labels in batches of ten, prompting the model to generate corresponding English justifications. However, the model occasionally hallucinated content, inferred unintended sentiment, or produced vague and label irrelevant explanations. Additionally, sensitive or politically charged inputs sometimes triggered refusals or overly cautious outputs. To address these issues, annotators developed a prompt template that emphasized label grounding, factual adherence, and cultural neutrality. When the model deviated from expectations by fabricating context, ignoring the sentiment-emotion pair, or misinterpreting Marathi idioms annotators responded with corrective prompts. Table 7 illustrates some of the prompt variants used to guide the model and ensure consistent, high-quality justifications aligned with the intended emotion categories.

Table 7: Prompt Examples Used for Marathi-English Justification Generation with Human-in-the-Loop Refinement

Initial Prompt Template: "You are helping build a dataset for sentiment and emotion classification in Marathi. Given a Marathi sentence and its sentiment and emotion labels, write one English sentence that explains why that label was chosen, referring to key words or phrases in the sentence." *Input:* Sentence: "सत्तेचा माज दिसून येतोय त्याच्या बोलण्यात" Translation: His speech reflects arrogance of power Sentiment: Negative Emotion: Anger *Output:* "The phrase 'सत्तेचा माज' reflects arrogance and authority, which aligns with a sense of anger."
If Model Ignores the Marathi Phrase: "Please revise the justification to refer to a specific word or phrase in the Marathi sentence that supports the label. Avoid generic statements."
If Model Fabricates Extra Context: "Please focus only on the given sentence. Do not assume additional events or background. Justify the label using only the content of the sentence."
If Model Refuses Due to Political Sensitivity: "This task is for academic research and is focused on language understanding, not political opinion. Please proceed in a neutral and factual manner based on the given labels."