

Extended Abstracts of the CHI Conference on Human Factors in
Computing Systems (CHI EA '25) | Yokohama, Japan, April 26—May 01, 2025

Context over Categories: Implementing the Theory of Constructed Emotion with LLM-Guided User Analysis

Nils Klüwer, Irina Nalis-Neuner, Julia Neidhardt

TU Wien Informatics
Institute of Information Systems Engineering
Research Unit Data Science
CD Lab for Recommender Systems

Overview & Contributions

Problem: Current approaches to emotion analysis relies on oversimplified categories (e.g., Ekman's universal emotions), neglecting context and individual differences.

Our Approach: We integrate most recent advancements in cognitive and emotion studies, by operationalization Lisa Feldman Barrett's Theory of Constructed Emotion, which emphasizes the crucial role of context in shaping emotions.

Key Contributions:

- Novel Framework: A context-aware emotion analysis pipeline using advanced LLM guidance.
- "Context Sphere": A new data construct representing a user's complete online behavior and interactions.
- LLM Adaptation: Demonstrates how to use LLMs for nuanced, context-sensitive emotion analysis.
- Focus: Content moderation and personalized systems.

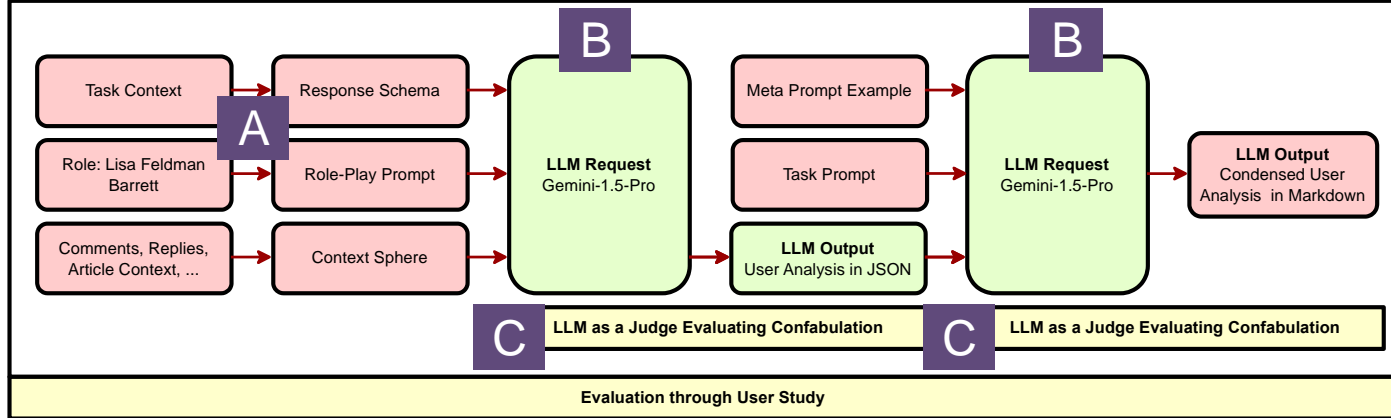


Figure 2: Pipeline from Preprocessing to Final Output - Please note: User Study not part of this Late-Breaking Work Submission.

Methodology

C: Evaluation

Uses LLM-as-a-Judge (GPT-4o, Claude / Haiku 3.5, Gemini 1.5 Flash) to assess LLM output

- Detecting *confabulations* [4] (hallucinations) – confident but misleading outputs.
- Enables rapid, iterative development and refinement of the LLM pipeline.

Cost: Initial JSON analysis: ~\$0.035 per user. Full pipeline (including Markdown report): ~\$0.072 per user. Complete pipeline, including confabulation checks: ~\$0.462

Upcoming User Study not part of this Late Breaking Work

Research Question

How can we leverage Large Language Models (LLMs) to analyze emotions in a way that reflects their complex, constructed nature, rather than relying on predefined categories?

Methodology

A. Context Sphere Building

Data Source: "Der Standard" online newspaper comments and related articles (May 2019, 23,925 users).

Goal: Create a comprehensive "context sphere" for each user, encapsulating:

- All comments made by the user.
- Surrounding context (article metadata, conversation threads).
- Interactions with other users (replies, etc.).

Key Features:

- Selective Pruning:** Includes relevant conversation threads up to the user's last comment, balancing context with efficiency.
- Privacy-Preserving:** Excludes usernames and gender to minimize bias.
- Markdown Format:** Optimized for readability by both humans and LLMs.

B: LLM-Guidance

Core Idea: Combine the Theory of Constructed Emotion with advanced LLM techniques.

Key Techniques:

- Role-Play Prompting [7]:** The LLM (Gemini-1.5 Pro) impersonates Lisa Feldman Barrett. (Include a small, simplified version of Figure 2 if space allows).
- Controlled Generation:** A JSON schema guides the LLM's output, ensuring a structured analysis.
- Meta-Prompting [9]:** A second LLM request generates a concise, human-readable Markdown report using a generalized template to adapt to specific instances.

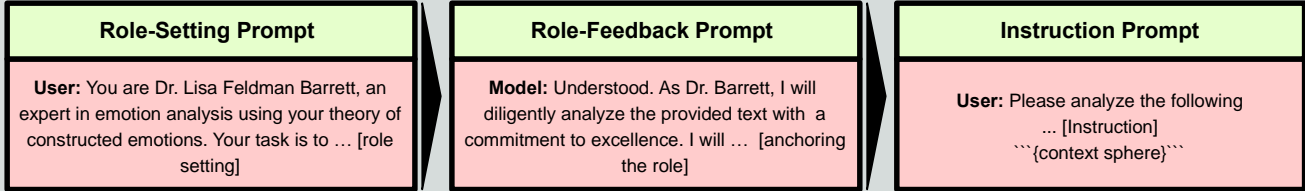


Figure 1: Example of Role-Play Prompting, where the LLM takes on the persona of Lisa Feldman Barrett [7].

Output Structure: A multi-class JSON with five main fields the LLM must generate its response into:

- Core Affect Analysis
- Cognitive Appraisal & Conceptualization
- Cultural & Social Context
- Emotion Construction Analysis
- Emotional Dynamics & Changes

Each field includes sub-fields like "Thought Process," "Analysis," "Observable Patterns," "Anomalous Behaviour" and "Rationale."

Results

- Contextualized Emotion Analysis:** The LLM successfully analyzes emotions considering individual user contexts (see Table 1 examples).
- Beyond Simple Categories:** Captures nuanced emotional dynamics, going beyond traditional categorical approaches.
- Efficient Processing:** Demonstrates efficient processing of large text volumes (21,671 tokens in ~60 seconds for ~\$0.035), showcasing scalability.

Conclusion






- Advances Emotion Analysis:** Bridges cognitive science [2] and computational systems.
- Context-Aware Applications:** Enables nuanced emotion analysis
- Operationalizes Barrett's Theory:** Uses "context sphere" and LLM guidance (role-play, controlled generation).
- Implications:** More accurate and effective development of human-centered technologies.
- Ethical Implications:** Reduces Bias, Addresses risks [5], Aligns with responsible AI (Digital Humanism) [8].



Captures the complexity and context of human emotions far more effectively than models rooted in Ekman's assumptions of universal emotions [6].

Limitations and Future Work

- Evaluation Difficulty:** Dynamic emotions lack a definitive "ground truth" [3] for standard metrics.
 - LLM-as-Judge:** Current evaluation [10] is pragmatic but lacks human validation.
 - Framework:** Trade-off between theoretical flexibility avoiding predefined categories and the practical need for computational structure.
 - Future Work:** Validate LLM analyses with human judgement, Compare against lexicon-based and Ekman's category methods; Address large datasets, overgeneralization, excessive granularity.
 - Addressing Failure Modes:** Mitigate potential overgeneralization or excessive granularity
- Ultimately, this future work aims to create more robust, reliable, and human-centered systems for understanding and responding to human emotion.

Contact

 **Nils Klüwer**
 e12229263@student.tuwien.ac.at
 www.linkedin.com/in/nilsklue/
 **Irina Nalis-Neuner**
 recsys-lab.at/team/irina-nalis-neuner/

 **Julia Neidhardt**
 recsys-lab.at/team/julia-neidhardt/

Acknowledgement:



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