

# Beyond LLMs: Cognitive-Emotional Trajectories of Human vs. Machine Authorship

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## Introduction

- Human writing **changes over time** through learning, emotion, and cognitive growth.
- LLMs, however, **do not accumulate experience** and produce static text.

## Current Problem

- Existing authorship and LLM-detection methods rely on **static lexical, stylistic, or embedding features**.
- These **snapshot approaches ignore temporal evolution**, failing to capture how human writing **changes across years** — a dimension LLMs fundamentally lack.
- As a result, current detectors cannot characterize **trajectory-level divergence between human and LLM writing**.

## Hypothesis

- Humans show **higher temporal drift** than LLMs.
- Therefore, long-term trajectories offer a **uniquely human signal**.

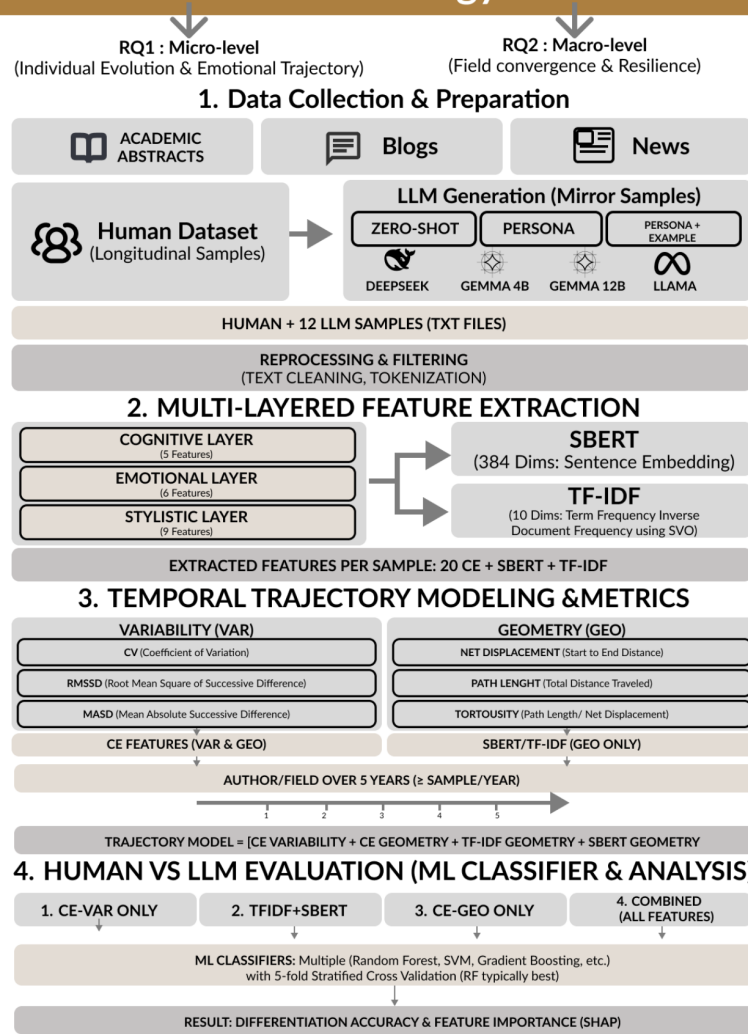
## Research Questions

- RQ1 (Micro):** Do individual human authors evolve their **stylistic and emotional trajectories** over time, unlike LLMs?
- RQ2 (Macro):** Do entire **domains converge** toward LLM-like styles, or do they remain resilient?

Code & Results  
(Scan)

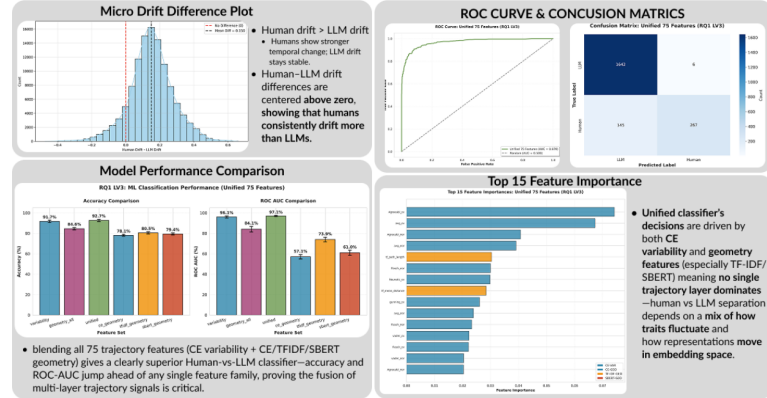


## Methodology



## Results

### RQ1: Micro-Level Results (Individual Evolution & Emotional Trajectory)



**MICRO-LEVEL CONCLUSION:**

- Humans exhibit significantly larger semantic drift than LLMs, reflecting ongoing changes in cognition, experience, and writing style over time.
- Our Unified Model (75 features) achieves the highest detection accuracy, showing that combining local fluctuations with global trajectory patterns provides the strongest signal for distinguishing Human vs. LLM writing.

### RQ2: Macro-Level Results (Field Convergence & Resilience)

