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Cognition Meets Affect: A CAPS-Inspired Multimodal Framework for Personality Prediction

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Abstract

Personality computing has long struggled to bridge the gap between high-level psychological theories and low-level computational features. To address the lack of psychological grounding in personality computing, we propose a multimodal framework based on the **Cognitive-Affective Personality System (CAPS)**. We decompose inputs into "Cognitive Units" (semantic construal) and "Affective Units" (emotional reactivity). Specifically, we introduce a parameter-free **Matrix-Based Entropy** mechanism to dynamically weight hidden states from **Qwen2.5-3B**, treating representational entropy as a measure of cognitive complexity. For audio, we combine linguistic content (Wav2Vec2) with prosodic features (OpenSMILE). Evaluated on a new self-reported Chinese dataset, our approach significantly outperforms unimodal baselines. Crucially, interpretability analysis reveals that the model's internal entropy profiles spontaneously recover latent psychological meta-traits (Plasticity and Stability), demonstrating that our architecture effectively bridges deep learning features with the intrinsic structure of human personality.

Keywords: Big five traits; Personality Assessment; Multi-Modal Learning; Large Language Models