An Adaptive Chatbot Framework for User Profiling through Prakriti (Phenotype) Analysis

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Abstract— Evaluating the health constitution of a person, or Prakriti, is still not a straightforward task because most practitioners depend on their own assessment rather than a unified protocol. In this paper, We introduce Chaturya, a hybrid symbolic-neural architecture that brings transparency to the reasoning process. The system is designed to process straightforward portrayals of a person's characteristics and clean them initially. Then, the Feature Selector and Difficulty Scorer determine how the inputs should be treated, and TreeBuilderV2 groups the individual into either a binary or a tertian trait system. To better know the traits, the model Token Embed and Compare them with a tiny trait reference table. Next, an RL-based module edits the tree by cutting minimal links and shifting some weights, a step that involves optimistic and pessimistic simulations for a balanced outcome. The system can also keep snapshots of the tree so we can check how stable the structure is during these edits. Finally, a little generator gives the Vata-Pitta-Kapha scores with brief advice along with the exact matching traits and similarity values so that a human can cross check the result in case of need. Right now, the first three stages — preprocessing, tree formation and the neural scaffolding — are operational. The subsequent stages, including clustering, the C-agent, and the data ingestors, are still under construction. The prototype currently runs on Google Colab and is guided by a ten-phase development plan.

Keywords—**Ayurveda, Prakriti Classification, Vata-Pitta-Kapha, Interpretable Machine Learning, Knowledge Graph, Reinforcement Learning Feedback, Semantic Embeddings, Health Personalization**

I. INTRODUCTION

In Ayurveda, once the Prakriti or natural constitution of a person has been determined by consulted an expert. Various characteristics are compared and rated with respect to Vata, Pitta and Kapha giving a proportional score. It's a system that has served well for centuries, but it hinges on the lone doctor's estimate. So, two specialists won't necessarily rate the exact same individual. This becomes even more difficult when we try to scale the process or even explain how a score was given. For machine learning models, it gets worse because they are often black boxes. They present a final result, but the user can't understand why or how the model came to that decision. For something in the health space, where trust is incredibly important, a model like this should be completely transparent and open for validation.

Prakriti Evaluation is just multiple minor observations like body structure, skin texture, emotional inclination, and sleep patterns. Usually signs like these are observed and experienced practitioners intuitively feel the quantity of Tri-Dosha's (Vata, Pitta, Kapha) present in the person's body. This technique can only be used in a one-on-one session with the patient, but it can be more in error when many people need to be evaluated within a short time. Although, experts also sometimes don't agree after all the interpretation is subjective and individual for each expert.This relatively non-standard process makes it hard to reproducing results (leading to high false positive/false negative) in larger system..

Our method builds upon Chaturya in a neuro-symbolic layered architecture with a small reinforcement-learning layer. The overarching motivation is to steer away from a black-box style model and create a system that allows for inspection and traceability at each step. Symbolic is for structured elements like hierarchical trait trees, structural locks, and audit logs. These make the system be clear by providing a clean history of how the decision structure was constructed. On the neural side, token embeddings and pattern-matching mechanisms contribute in capturing the semantic information of each trait. A small RL critic then analyzes the structure, experiments with small modifications, and rates them on whether they improve the final representation. Integrating symbolic clarity with neural adaptability, Chaturya stages to adhere to conventional Ayurvedic logic yet employs useful and contemporary computational means. This synergy results in a more robust and interpretable system, and one that is more applicable to situations where transparency is critical.

With technology inserted into this process, using machine-learning Models, the intent is usually to make the system faster and more scalable. Many machine learning models do not indicate how they came to that output. It may give Vata-Pitta-Kapha score, but doesn't disclose which traits gives more weight or why decisions were made. So doctor, researcher and user may not get full trust on the result because they cannot verify or understand the rationale behind the output. People want clarity and to understand their bodies -- not just a handful of answers." A model can be quick, but if it can't explain itself it's much harder to trust when trust matters most in personal health."

The prototype is at a multi-phase stepwise pipeline. The cleaning and pre-processing of input data form the first component. Feature Selector drops the identification fields and transforms categorical features to one-hot vectors. Difficulty Scorer also inspects the difficulty factors such as ambiguity, text length, domain words, etc. and scores each input. This score determines if the data will be through processing by a binary or a three-tree structure. After this, the system begins to build the symbolic structure.