Machine learning modeling practices to support the principles of AI and ethics in nutrition research

The paper discusses the application of artificial intelligence (AI) and machine learning (ML) models in nutrition research. While the paper primarily focuses on best practices for AI/ML modelling in nutrition research, it does touch upon data modelling AI.

The paper talks about how important it is to use careful modelling processes in nutrition research to avoid misleading conclusions and ethical issues. The main theories highlighted in the paper include:

- **Combining Explainable and Non-Explainable Models:** The paper emphasizes the importance of combining non-explainable models like neural networks with explainable methods such as logistic regression to maintain model interpretability

- **Generalized Linear Models (GLM) Framework:** It mentions that GLM framework helps in understanding which elements of a model should be explainable, where covariates represent the explainable part of the model

- **Generalized Linear Mixed Effects Models (GLMM):** GLMMs are discussed as a way to partition uncertainty into model-based and data-based uncertainty, enhancing model interpretability

- **Explainable AI:** The paper stresses the need for AI/ML models to be interpretable, allowing for understanding of key aspects of the model's behavior and decision-making processes

- **Ethical Concerns and Bias Mitigation:** It underlines the iterative and tailored processes required in AI/ML modeling to mitigate potential ethical problems and biases in nutrition research

The paper provides a tutorial on best practices for AI/ML modeling in nutrition research, offering a checklist and guiding principles to aid researchers in developing, evaluating, and implementing AI/ML models effectively while reducing ethical issues and bias concerns

While the paper offers valuable insights, there are some critics and challenges that can be highlighted. Criticism has been raised regarding methodological flaws in studies using machine learning, such as lack of transparency in key modelling decisions and absence of model validation experiments, which can undermine the credibility of the findings