# Predictive Modeling and Interpretability Techniques for SoC Performance with Machine Learning

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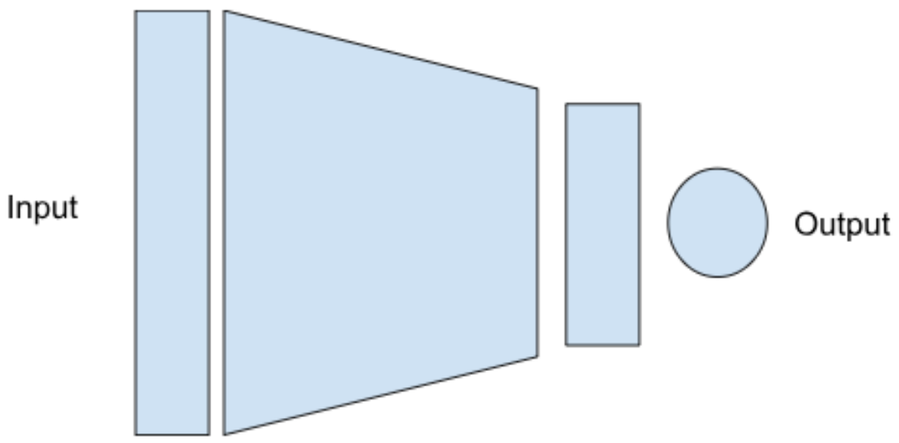
## Introduction:

Accurate SoC performance prediction via machine learning is crucial for informed hardware decisions. It offers a superior alternative to traditional benchmarking, predicting unseen hardware performance without relying on specific workloads. While accuracy matters, prioritizing interpretability and transparency builds user trust and meets regulatory requirements.

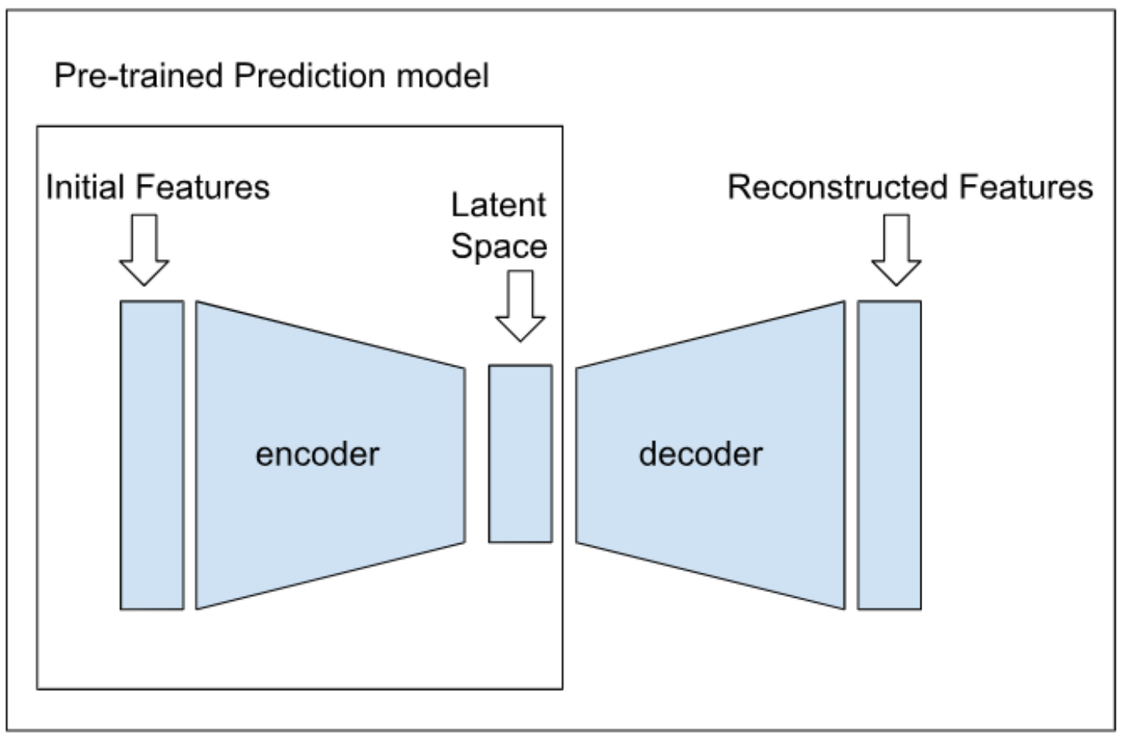
## Performance Prediction:

The trapezium MLP network shows strong performance, especially in the $R^2$ score. Despite MLP's usual disadvantage compared to CNN, it's important to consider that CNN is significantly larger and slower. This tradeoff could impact overall model efficiency.




## Interpretability:

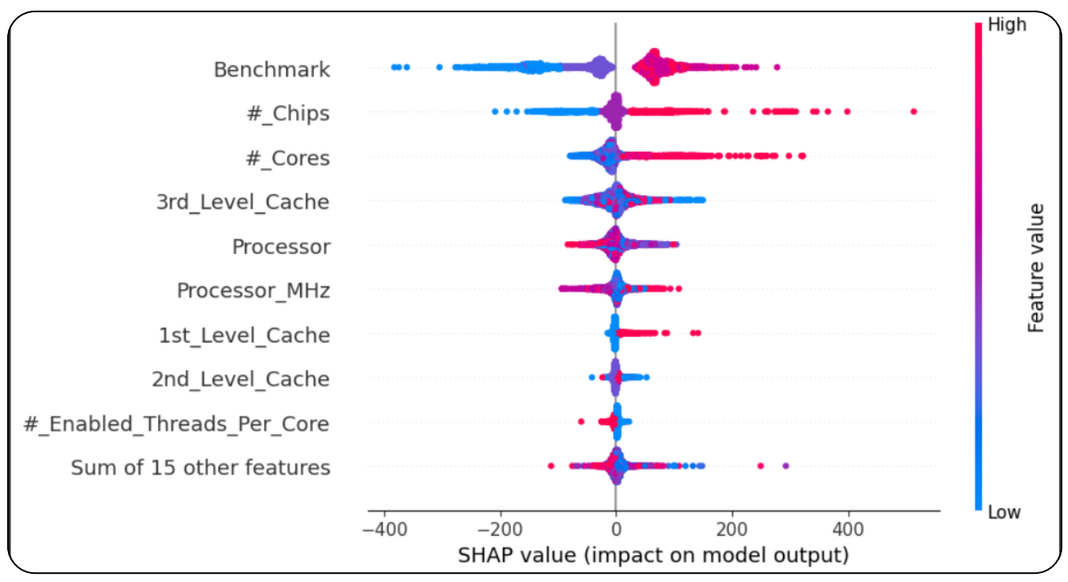
### Autoencoder:




Autoencoders boost model interpretability by reconstructing input data from a latent space generated by the prediction model, offering valuable insights into the features and patterns the model learns throughout training. They also facilitate enhanced dimensionality reduction, leading to more efficient data representation.

### SHapley Additive exPlanations (SHAP):

SHAP (SHapley Additive exPlanations) helps in model interpretability by providing individual feature contributions to model predictions, allowing for a better understanding of how each feature influences the model's output.




### Feature selection:

Feature selection helps in model interpretability by identifying and prioritizing the most relevant features, allowing for a clearer understanding of which input variables contribute most significantly to the model's precision.