I have built a Machine Learning model that can be used to predict the miss rate by providing an application from benchmark suits and for any user speciﬁc conﬁguration i.e. data cache(d cache) retention time, Write Latency and Write Energy. Each model will be architecture-speciﬁc, and in our case it’s ARM V7. Our model is essentially a 2 stage Ensemble Machine Learning model. The main challenge is to cover as many the applications along with dealing with the fact that most of these models are micro-architectural and application dependent. In our project we deal with both micro-architectural dependent and independent features in each application to develop a model as generalized as possible which can be useful when it comes to using the different applications with different conﬁguration sets.

A screenshot of a cell phone

Description automatically generated

The working algorithm for our project is shown in ﬁgure 3. In principle our approach essentially is akin to an ensemble where we develop Random Forest(RF) Regressors for each of the four feature in the primary stages and these feature’s individual

predictions are ﬁnally tested against the miss rate at ﬁnal stage in our ﬁnal model. In our project we experimented with several machine learning algorithms like Adaboost, Decision Tree, Support Vector Regressor(SVR), K- Nearest Neighbor(KNN) and Naive-Bayes beside Random forest for individual feature Regressors at the primary stage. To elaborate further, for each of these four features we trained individual feature’s RF Regressor (no. of estimator = 1000) with Write Latency and Write Energy as inputs. These RF Regressors are then tested for the predicting that particular feature against the test data. After a prediction is made at individual RF stage we ﬁnally test all four feature’s outcome for predictions using a KNN Regressor (K=13) against the miss rate from Dataset 2 in the ﬁnal stage.