A Novel Approach for Confidence Estimation using Support Vector Machines for more Accurate Value Prediction

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Abstract

Data dependencies create hurdles in exploiting ILP among instructions. To overcome them, data value predictors are used which guess instructions’ result before it is actually executed. Thus, future instructions which depend on the outcome of that instruction executes sooner. But, since Value Prediction accuracy is very crucial in determining the amount of parallelism that can be exploited, Confidence estimation is used along with it to lessen the value prediction misprediction penalty by guessing whether or not to use a value prediction result.
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Previous confidence estimators were based on perceptrons which had the limitation of learning only linearly separable functions,[2, 24]. But sometimes linear inseparability may arise when a correct prediction on a past instruction causes the current instruction to predict incorrectly [25]. As Support Vector Machines belong to a family of generalized linear classifier and can be interpreted as extension of perceptron, they are both linear and non-linear classifiers and are computationally more efficient than perceptrons. Thus, we propose a confidence estimator using SVM’s in which the prediction accuracy of previous instructions is used to estimate the confidence of current prediction and decide based on its results whether or not the prediction is likely to be correct. The classification algorithm of SVM is implemented using MATLAB platform, and its novel learning methods have been applied on different data sets having two classes.

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Index Terms

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Keywords

Value Prediction  Confidence Estimation  Svm.