Towards Statistical Guarantees in Controlling Quality Tradeoffs for Approximate Acceleration

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To tackle these shortcomings we devise **MITHRA**

Fixed Error

Lack of Error Control

Lack of Guarantees
Challenge: What Type of Guarantees are Possible

Approximate Accelerator

Local Error

Final Quality loss

Statistical Guarantees

What guarantees?
Challenge: How to Eliminate Anomalous Invocation

Approximate Accelerator

Local Error

Final Quality loss

How to eliminate anomalous invocations?

Look at the accelerator inputs

How to eliminate anomalous invocations?

Approximate Accelerator
Challenge:
How to Map Final Quality to Local Error

Approximate Accelerator

Local Error

Final Quality loss

Threshold the local error

Final Quality loss → Local Error ?
MITHRA: A Hardware/Software Solution

Session 1B
11:00am-12:00pm
Monday June 20

Approximate Accelerator

Quality Requirement

Statistical Optimizer

Classifier Trainer

Hardware Classifier Topology

Application

Training Inputs