

Bachelor/Master Project

Effects of Approximate Computing on Workload Character

Description

Approximate Computing can leverage the gap between the accuracy provided by a system and the accuracy that is actually required for an application. Many applications are resistant to some amount of error as shown, e.g., machine learning, video or audio signal processing and therefore are candidates for optimization by approximation. Approaches include skipping of tasks or loop iterations; skipping memory loads and using approximating instructions. All these techniques change the *character* of the application.

Workload characterization describes what kind of work is actually done when executing applications, e.g., memory loads, arithmetic operations, etc. This discipline can be both depending on microarchitecture and independent of it.

Objective

In this project the effects of applying approximate computing techniques when considering microarchitecture shall be explored.

The objectives of this master project are:

1. Define a workload set based on popular benchmark sets.
2. Implement a number of approximate computing techniques using these benchmarks.
3. Evaluate how the workload character is affected, possible both.

Required Skills

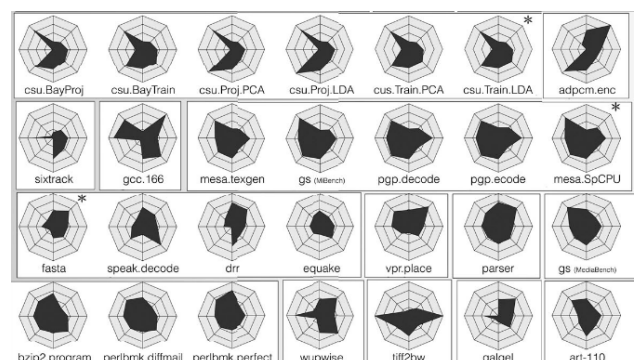
- ability to work self-sufficient/independent
- C/C++ experience
- preferably computer architecture knowledge & experience with binary instrumentation tools (e.g., pin, valgrind)

References

- [1] Hoste & Eeckhout: Microarchitecture-Independent Workload Characterization. MICRO'07.
- [2] Mittal: A Survey of Techniques for Approximate Computing. CUSR 2016.

Contact Person

Daniel Maier <daniel.maier@tu-berlin.de>
room EN-646



Kivat diagram of measured variables characterizing workloads [1].