

Approximate Computation with Topaz

Sara Achour, Martin Rinard

MIT

Topaz Overview

Opportunity

- Unreliable/inaccurate machines
- Cheaper, faster, more energy efficient
- Hard to model

Topaz

- Perform computation on approximate hardware without hardware specification

Problem: Crashes, Corrupted Critical Data

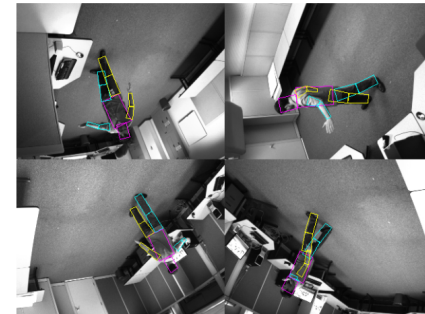
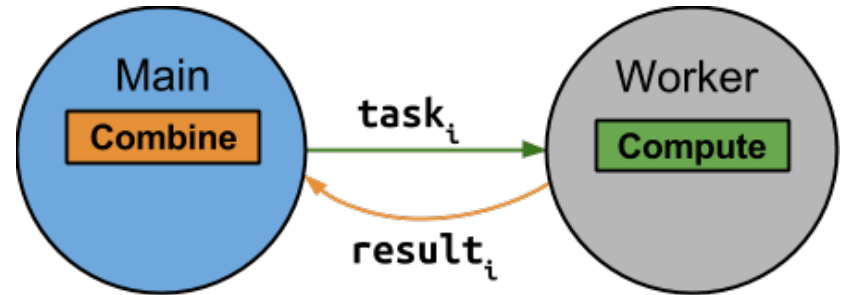
Solution: Compute-Combine Pattern

Problem: Bad Results

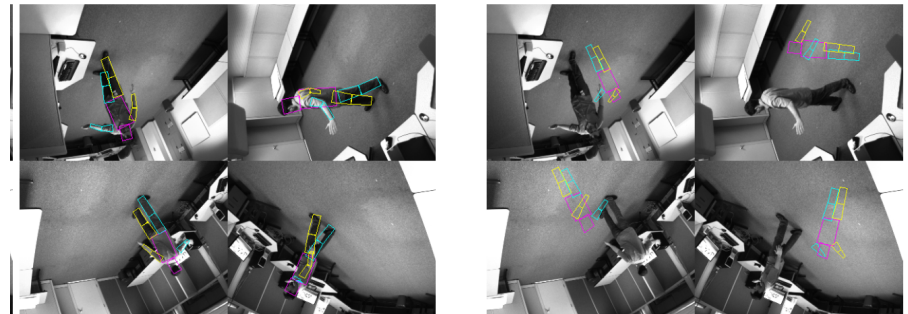
Solution: Outlier Detection

Problem: Communication Overhead

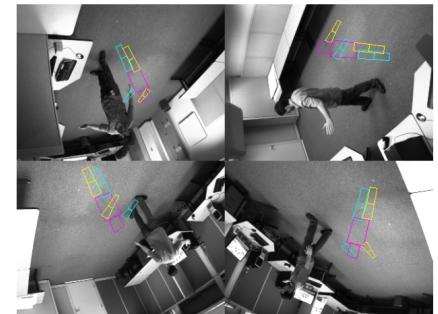
Solution: Constant Data w/Fault Driven Refresh



(a) Precise Execution



(c) Outlier Detection



(b) No Outlier Detection