

(54) Title of the invention : SYSTEM AND METHOD FOR AUTONOMOUS RECONFIGURATION OF PROGRAMMABLE HARDWARE FOR DYNAMIC WORKLOAD ACCELERATION

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(57) Abstract :

A system and method for autonomous reconfiguration of programmable hardware for dynamic workload acceleration, comprising an AI workload input module 101 receives inference requests from a host or network and forward workload data for runtime tracing and optional model context, a pattern detection engine 102 extracts repeated subgraphs or kernels from captured runtime traces, a self-evolving logic compiler 103 provides online or just-in-time (JIT) synthesis, managing partial bitstreams for detected patterns, a control and arbitration logic module 104 schedules and arbitrates which partial reconfigurable (PR) region to update, a FPGA-like reconfigurable fabric 105 with PR0-PR3 executes inference workloads while supporting independent partial reconfiguration of regions, a performance feedback monitor 106 measures actual deltas, such as latency, throughput, and energy, to determine whether to retain dynamic reconfiguration or initiate rollback, AI inference output module 107 finalizes and emits inference results with optional quality checks.

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