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Open-Source AI and Data Science for Silicon Validation

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Abstract

Modern System-on-Chip (SoC) designs generate massive volumes of logs during post-silicon validation, making manual debugging increasingly difficult. This talk explores how open-source artificial intelligence and data science tools can help engineers transform raw validation logs into actionable insights.

A practical workflow is presented for collecting, preprocessing, modeling, and analyzing validation data using machine learning and large language models. The session highlights when to apply ML for structured validation data and when LLMs are better suited for unstructured logs and documentation tasks.

The talk also introduces emerging generative and agentic AI workflows and discusses how these technologies can support automated debugging pipelines. Emphasis is placed on using AI to augment engineering workflows rather than replace them, enabling engineers to focus on complex reasoning while automation handles large-scale data analysis.