Del Algoritmo al Hardware:
Aprendizaje Automático en Sistemas Embebidos

From Algorithm to Hardware: Machine Learning in Embedded Systems

1 al 11 de Abril, 2025. Universidad Nacional de Mar del Plata - Mar del Plata - Argentina.

Programa preliminar

Day	Time	Topic
01/04	17:30- 19:30	Machine Learning and FPGA: Evolution and Current State of These Technologies. Edge AI (R. M.)
02/04	10:00 - 11:00	Machine Learning: From Theory to Practice (R. M.)
	11:00 - 11:15	Coffee break
	11:15-13:00	Machine Learning: From Theory to Practice (R. M.)
		Machine Learning: From Theory to Practice (R. M.)
	14:00 - 17:00	Model Compression For Machine Learning-based Models: Pruning, Quantization, and Knowledge Distillation (R. M.)
	15:00 - 15:15	Coffee break
		Model Compression For Machine Learning-based Models: Pruning, Quantization, and Knowledge Distillation (R. M.)
03/04	13:00 - 14:00	System-On-Chip on based on FPGA: Architecture and workflow (R. M.)
	18:00 - 19:00	High-level synthesis (R. M.)
04/04	9:00 - 11:00	Hands-on: Deep Neural Network Training and Verification (R. M.)
	11:00 - 11:15	Coffee break
	11:15 - 12:00	Hands-on: Deep Neural Network Training and Verification (R. M.)
	12:00 - 13:00	Hands-on: Deep Neural Network Model Compresion (R. M.)
	18:00 - 19:00	Hands-on: SoC-based FPGA Bring-Up: "Hello World" (R. M.)
		Hands-on: High-level synthesis (R. M.)
07/04	13:00 - 14:00	High-level Synthesis for Machine Learning (hls4ml) (R. M.)
		Workflow for Deep Neural Network Deployment On Embedded Architectures (R. M.)
	14:00 - 14:15	Coffee break
	14:15 - 15:00	Hands-on: High-Level Synthesis for Machine Learning (hls4ml) (R. M.)
08/04	11:00 - 13:30	Communication Block (ComBlock) (M. B.)
		HyperFPGA: Enhancing Education with Remote Laboratory Access (M. B.)

	13:00 - 13:45	Lauch break
	13:45 - 15:00	Hands-on: High-Level Synthesis for Machine Learning (hls4ml) (R. M.)
09/04	10:00 - 13:00	Machine Learning and SoC-based FPGA for real-case applications (R. M.)
		Hands-on: Deploying Machine Learning on HyperFPGA and SoC-FPGA Boards (R. M.)
	16:00 - 17:30	Hands-on: Deploying Machine Learning on HyperFPGA and SoC-FPGA Boards (R. M.)
	17:30 - 17:45	Coffee break
	18:00 - 18:50	Overview of Embedded Platform Architectures and Key Hardware Components for Machine Learning Applications (N. J.)
	18:50 - 19:00	Break
	19:00 - 19:50	Methodological Approach to Designing Embedded Platforms for Machine Learning (N. J.)
	19:50 - 20:00	Break
	20:00 - 21: 00	Practical Hardware Design Considerations for Embedded Platforms in Machine Learning Applications - Part I (N. J.)
10/04	18:00 - 18:50	Practical Hardware Design Considerations for Embedded Platforms in Machine Learning Applications - Part II (N. J.)
	18:50 - 19:00	Coffee break
	19:00 - 19:50	Managing Power Integrity Issues in Embedded Platforms for Machine Learning Applications (N. J.)
	19:50 - 20:00	Break
	20:00 - 21: 00	Addressing Signal Integrity Challenges in Embedded Platforms for Machine Learning Applications (N. J.)
11/04	9:00-10:00	AMD Xilinx - AI Engines (G. S.) [Confirmar horario]
	10:00-11:00	Project: SoC-FPGA & Machine Learning: A Deep Dive into Different Workflows
	11:00 - 11:15	Coffee break
	11:15 - 14:00	Project: SoC-FPGA & Machine Learning: A Deep Dive into Different Workflows
		Project: SoC-FPGA & Machine Learning: A Deep Dive into Different Workflows
	14:00 - 15:00	Project: SoC-FPGA & Machine Learning: A Deep Dive into Different Workflows - Participant Presentations
	18:00 - 18:50	Optimizing Electromagnetic Compatibility (EMC) and Mitigating Electromagnetic Interference (EMI) in Embedded Platforms for Machine Learning Applications (N. J.)
	18:50 - 19:00	Coffee break
	19:00 - 19:50	Design Exercise: Develop Architecture, Select Components, and create PCB Floor Plan for Specified Machine Learning Platform Requirements (N. J.)
	19:50 - 20:00	Break
	20:00 - 21: 00	Interactive Discussion and Analysis of Participant-Proposed Solutions (N. J.)

Lecturers

Romina Soledad Molina, Ph.D. (R. M.) - International Centre for Theoretical Phyiscs
Nikola Jovalekic, Ph.D (N. J) - Teledyne Healthcare | X-Ray Solutions
Maynor Ballina, Ph. D student (M. B.) - International Centre for Theoretical Phyiscs and University of Trieste
Gustavo Sutter, Ph. D (G. S) - Universidad Autónoma de Madrid