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## Early Performance and Energy Prediction of Neural Networks Deployed on Multi-Core Platforms

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► **To cite this version:**

Quentin Dariol, Sébastien Le Nours, Sébastien Pillement, Ralf Stemmer, Domenik Helms, et al.. Early Performance and Energy Prediction of Neural Networks Deployed on Multi-Core Platforms. GRETSI 2023 XXIXème Colloque Francophone de Traitement du Signal et des Images, Aug 2023, GRENOBLE, France. 2023-08, pp.ID PAPER 1144. hal-04186902

**HAL Id: hal-04186902**

**<https://hal.science/hal-04186902>**

Submitted on 24 Aug 2023

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# Early Performance and Energy Prediction of Neural Networks

## Deployed on Multi-Core Platforms

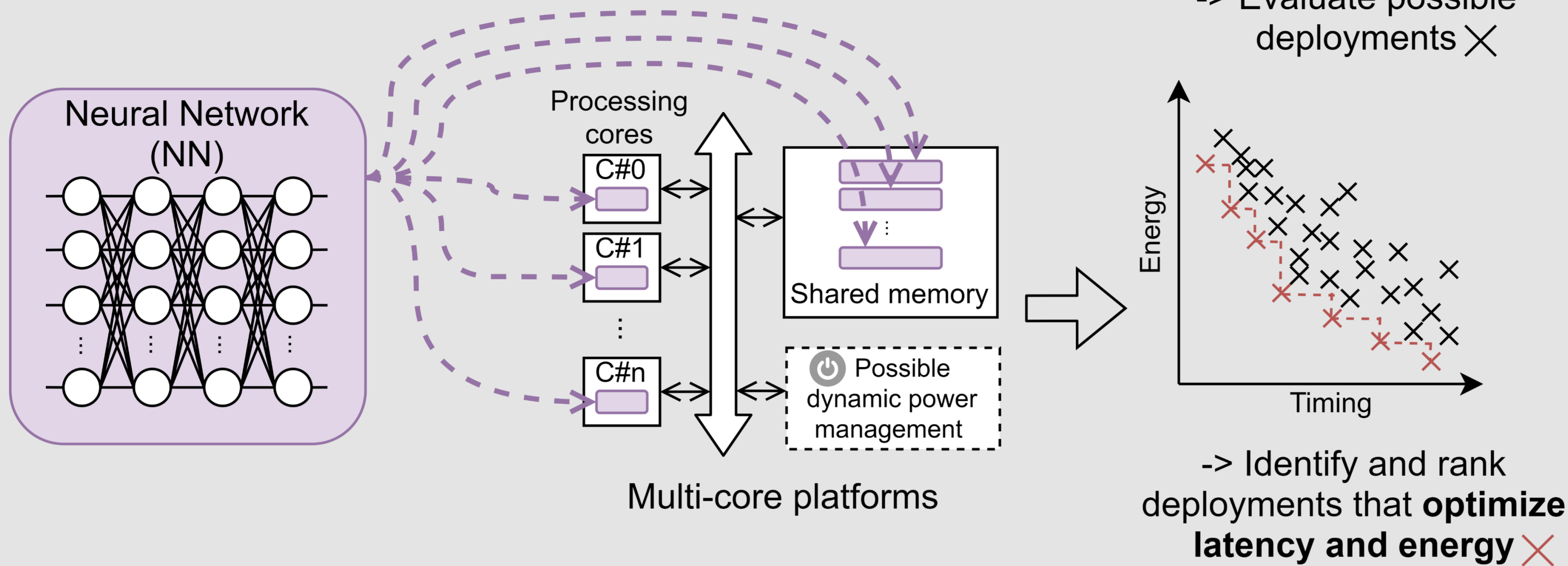
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### Motivation

#### Deployment?



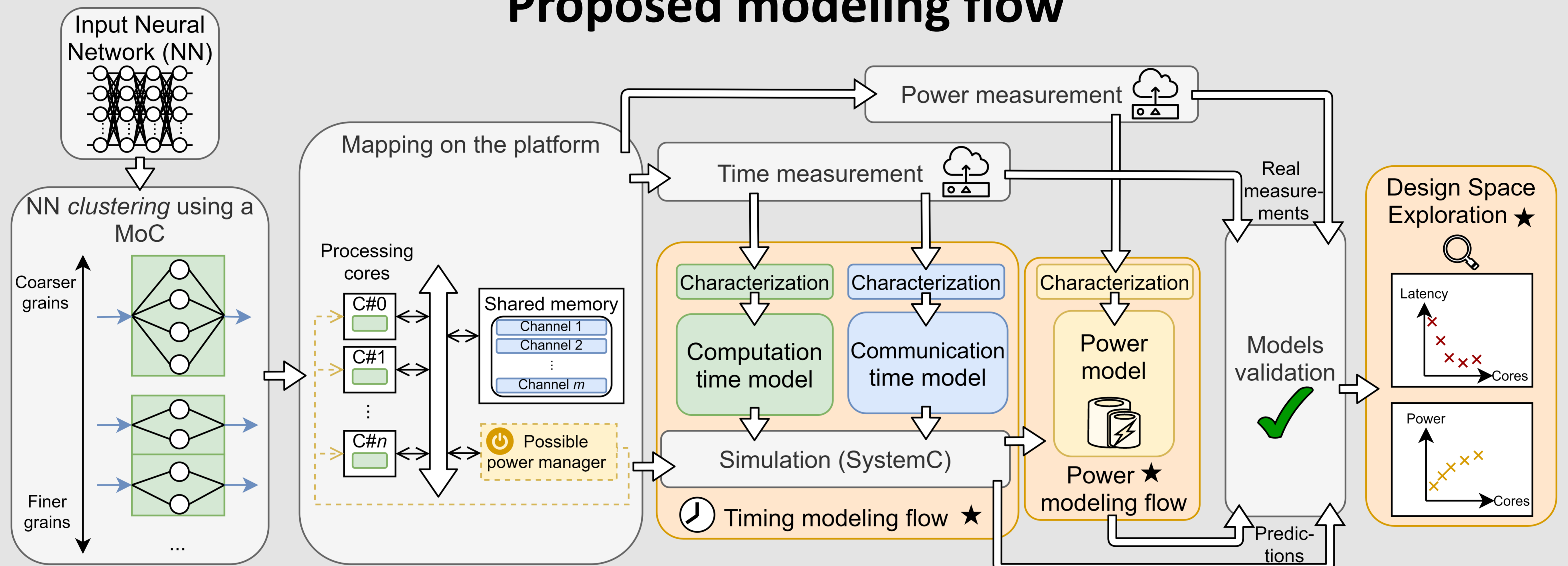
#### Context

- ❖ Raise of interest for **NNs deployed onto edge embedded platforms**, and more specifically **multi-core platforms**.
- ❖ **Early prediction** of non-func. properties (e.g. **latency, energy**) of NN deployments is necessary to **optimize execution and meet user defined constraints**.

**Challenges** - How to propose **fast yet accurate models** with scalability in consideration of:

- ❖ **Contention for shared resources**,
- ❖ **Computation/communication workload variability** between deployments,
- ❖ Influence of **power management strategies** (e.g. clock gating).

### Proposed modeling flow



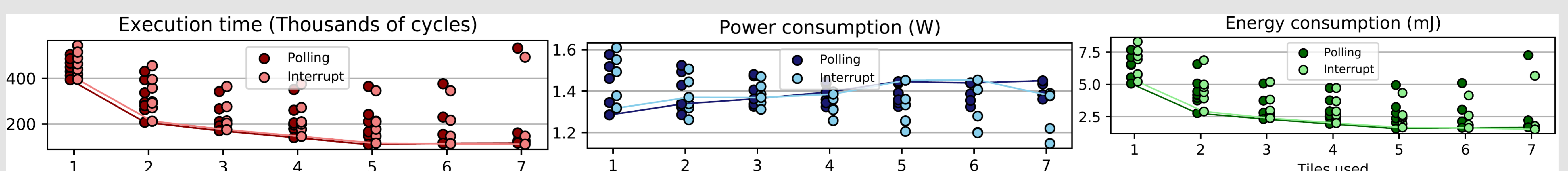
→ The proposed modeling flow relies on **calibration through measurements, analytical models and high level simulation** to offer **fast-yet-accurate evaluation**.

### Results

- ❖ **27 mappings** of 4 NNs including 1 CNN tested with and without power management.
- ❖ **Timing properties** predicted with **>97% accuracy**, and **energy properties** with **>95% accuracy**.
- ❖ More information on the project can be found on our **open source Git repository**:

<https://gitlab.univ-nantes.fr/lenours-s/pssim4ai>

→ Example use of the modeling flow to perform **Design Space Exploration (DSE)** under performance and energy constraints:



Poster presented during the GRETSI'23 colloquium, 28.08.23 – 01.09.23, Grenoble, France.

This work was funded by the WISE consortium, France in the project pSSim4AI and by the Federal Ministry of Education and Research (BMBF, Germany) in the project Scale4Edge (16ME0465).