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

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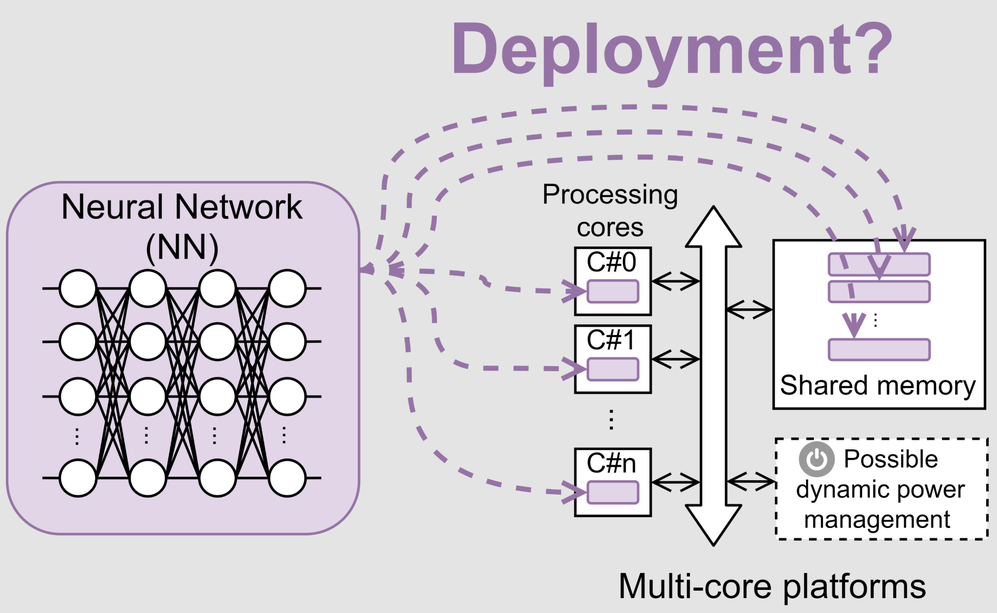
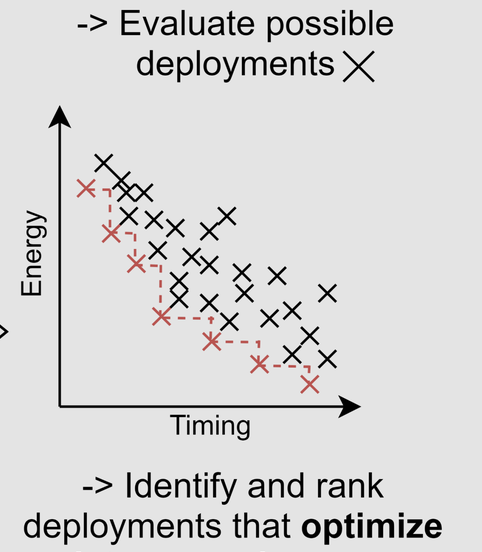
Motivation





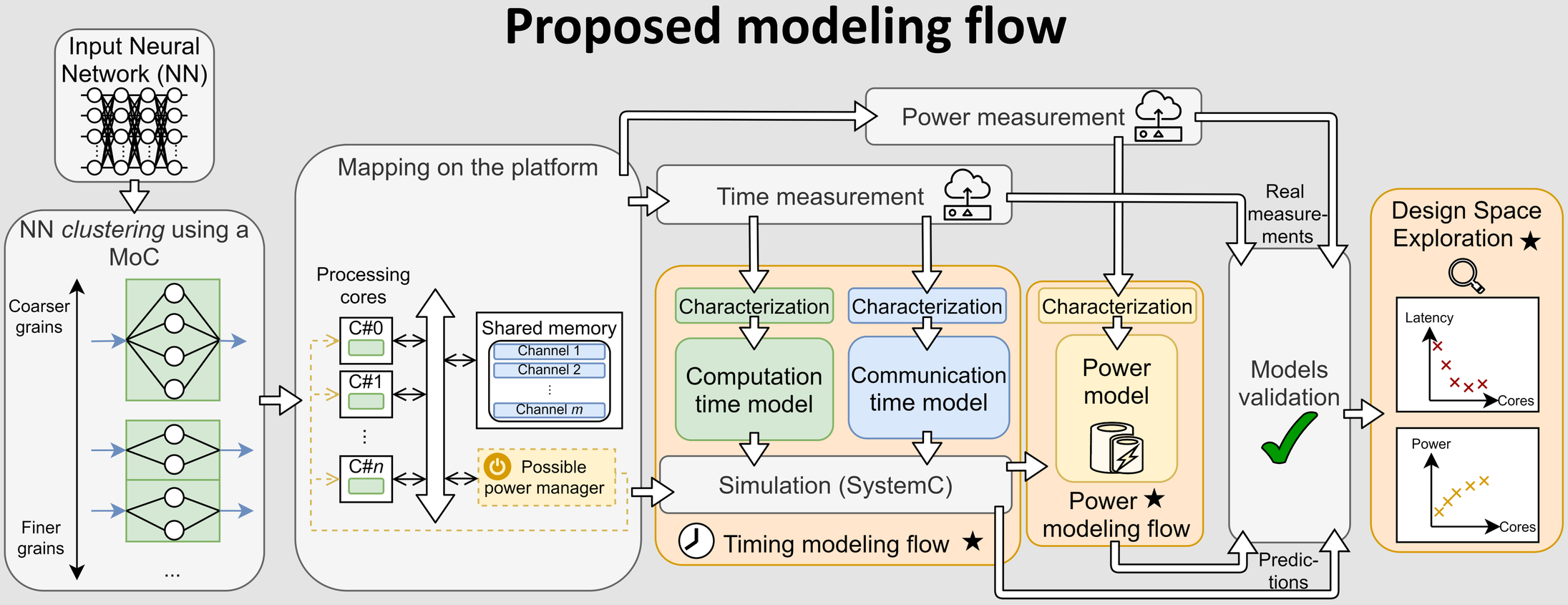
Context

- 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



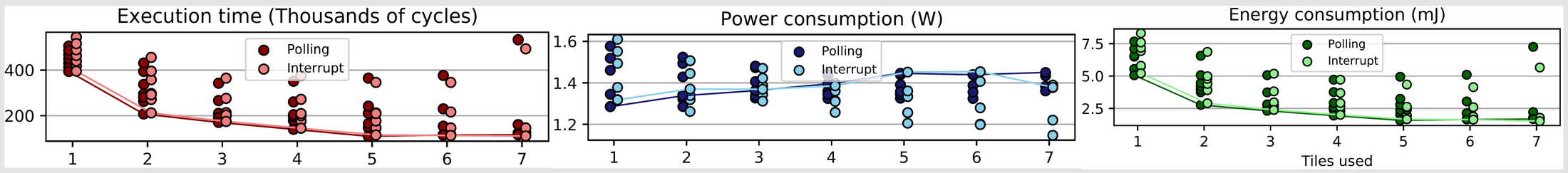
→ The proposed modeling flow relies on **calibration through measurements**, **analytical models** and **high level simulation** to **offer fast-yet-accurate evaluation**.

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:**



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