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

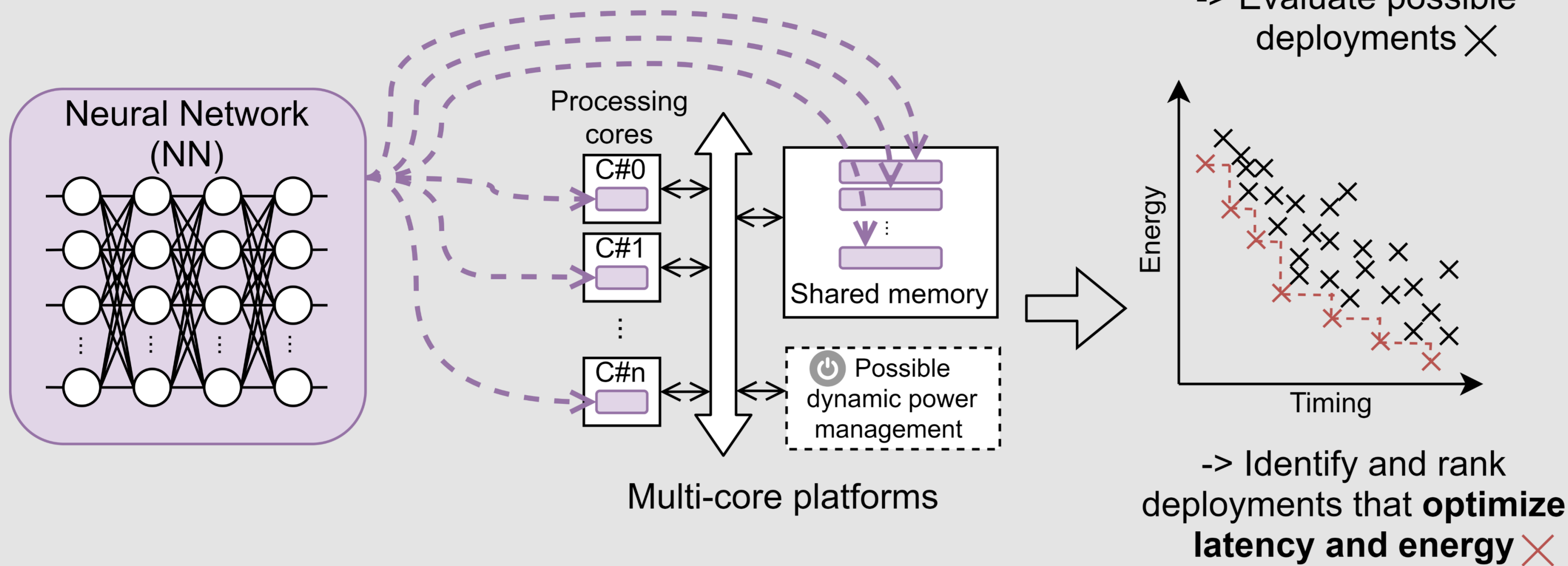
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Motivation

Deployment?



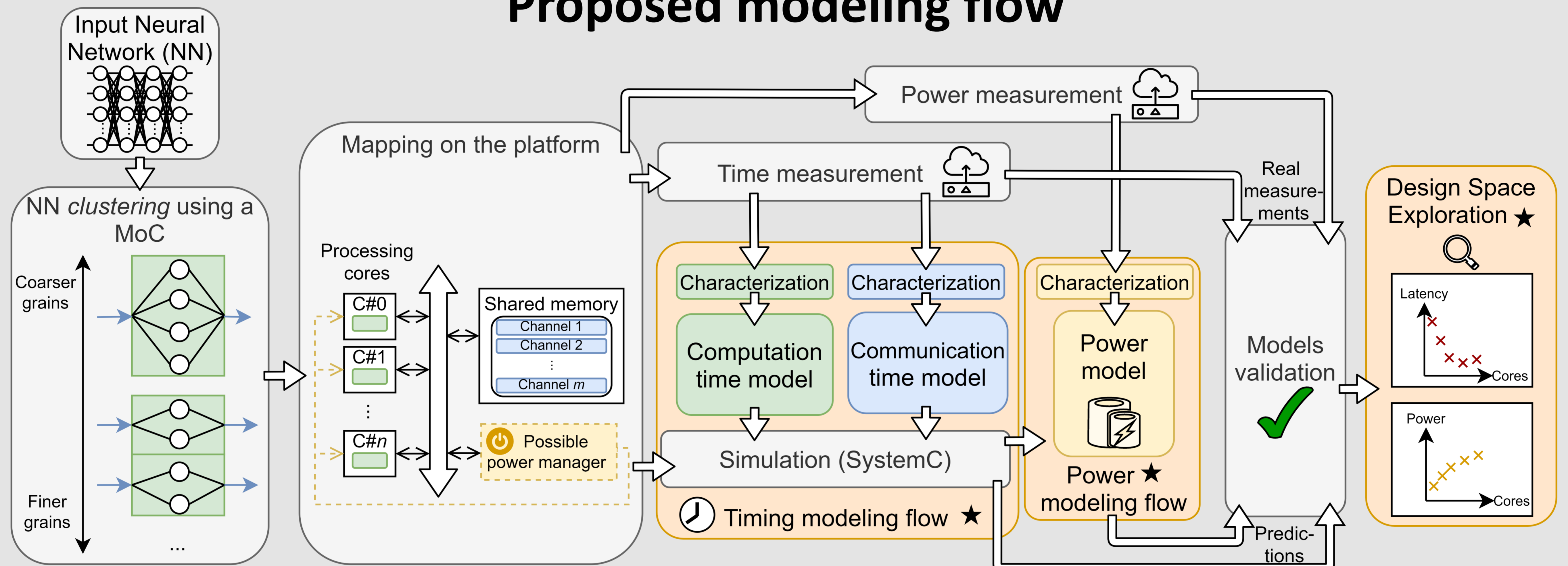
Context

- ❖ 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



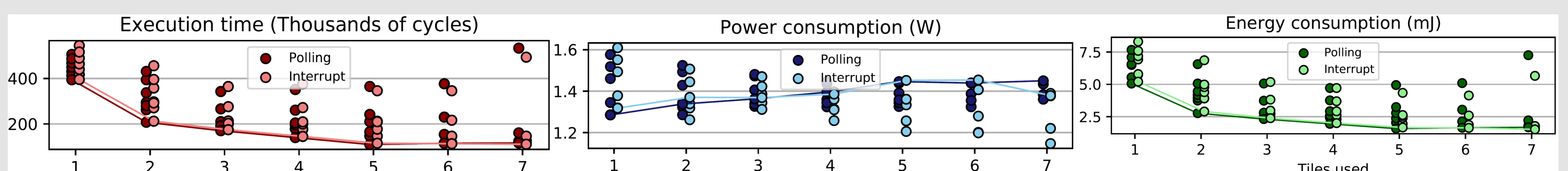
→ The proposed modeling flow relies on **calibration through measurements, analytical models and high level simulation** to offer **fast-yet-accurate evaluation**.

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:



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