



**HAL**  
open science

## **Strategic Input Selection for Deep Neural Networks Reliability Evaluation**

Lucas Roquet, Fernando Fernandes dos Santos, Maria Kastriotou, Angeliki Kritikakou

► **To cite this version:**

Lucas Roquet, Fernando Fernandes dos Santos, Maria Kastriotou, Angeliki Kritikakou. Strategic Input Selection for Deep Neural Networks Reliability Evaluation. NSREC 2025 - IEEE Nuclear & Space Radiation Effects Conference, Jul 2025, Nashville (Tennessee), United States. 2025. <hal-05273538>

**HAL Id: hal-05273538**

**<https://hal.science/hal-05273538v1>**

Submitted on 23 Sep 2025

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



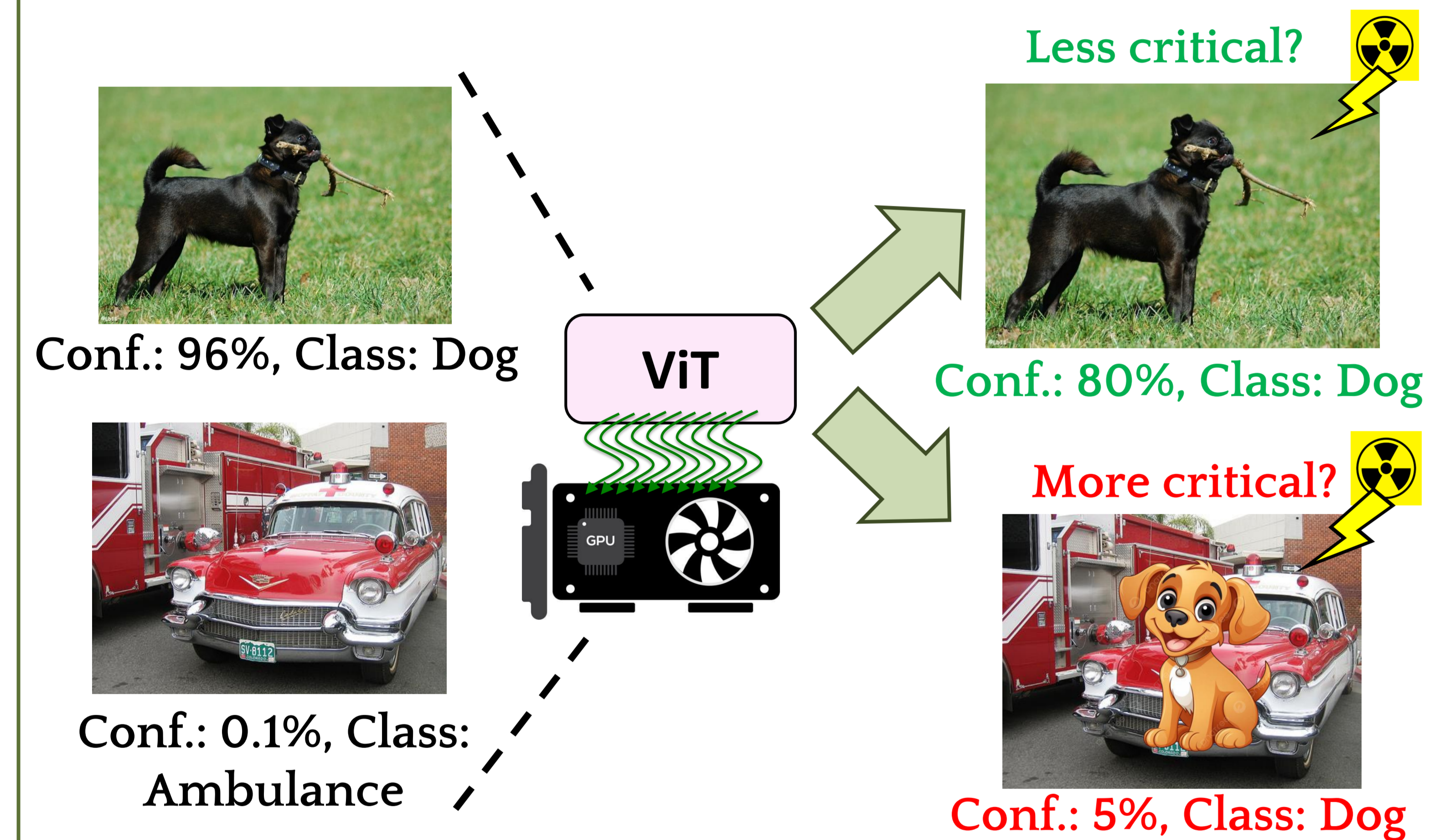
Distributed under a Creative Commons CC BY 4.0 - Attribution - International License

## 1. Introduction

DNN models executed on GPUs are vulnerable to transient faults from radiation such as neutrons.

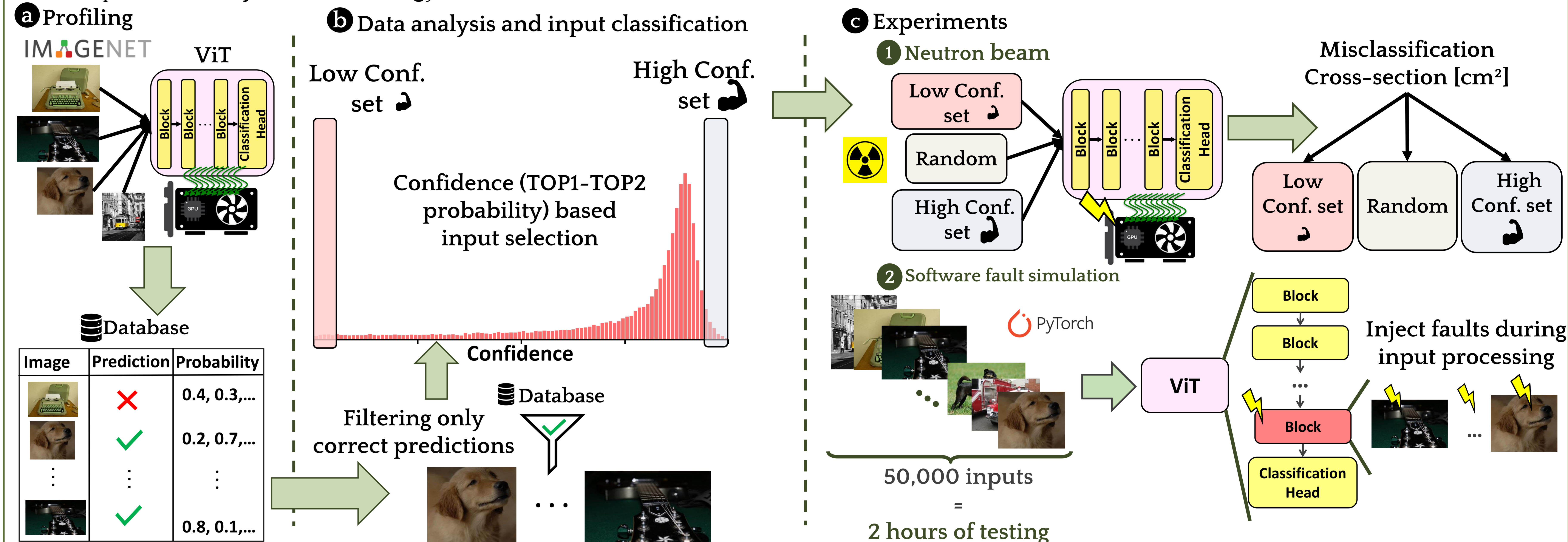
Motivation: Explore input dependency on misclassification rates

Goal: Develop a DNN input selection method for reliability

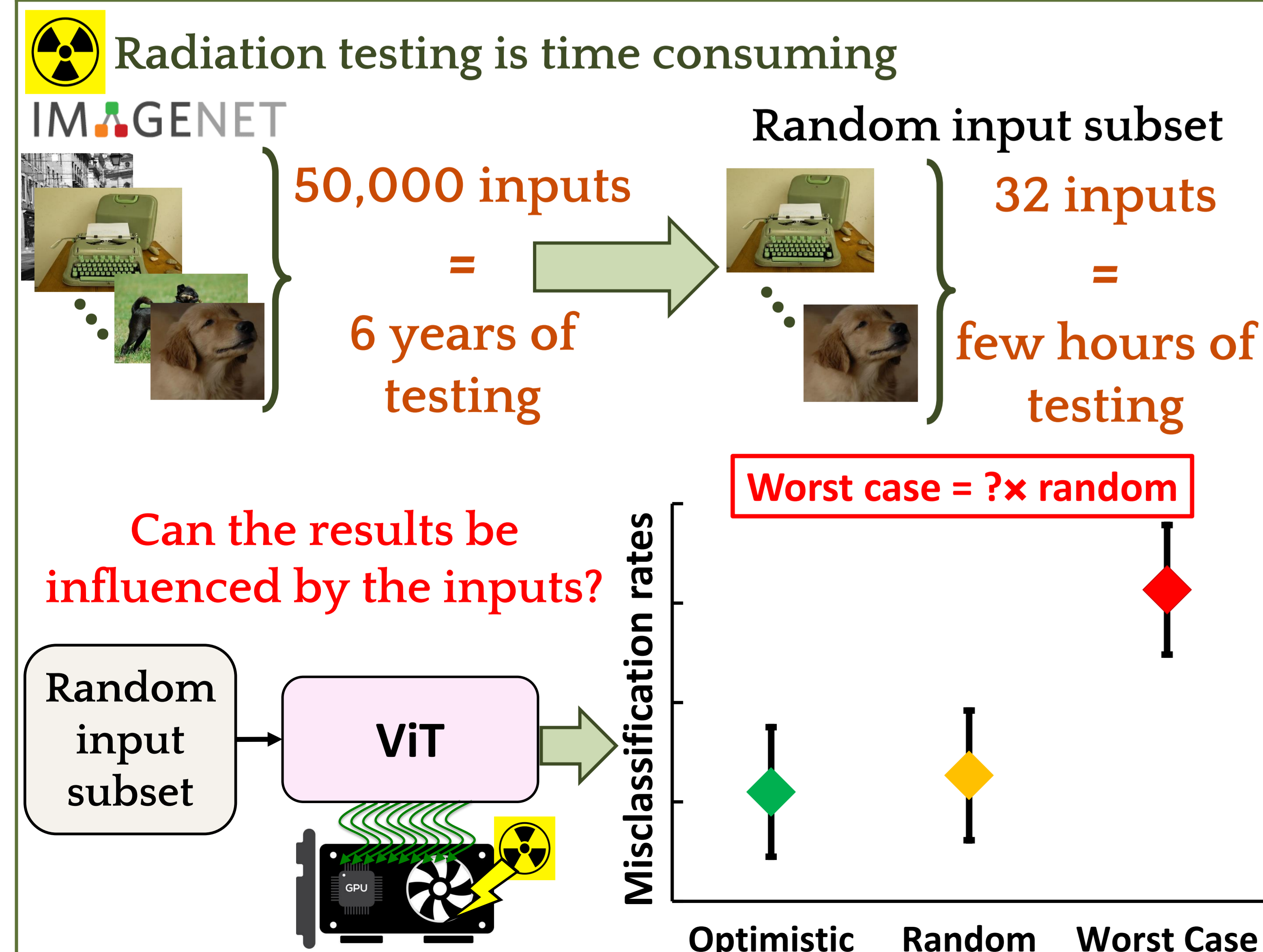


## 3. Overall Methodology

We adopt a **cross-layer** methodology to assess 2 DNNs under neutron beam and software fault simulation.

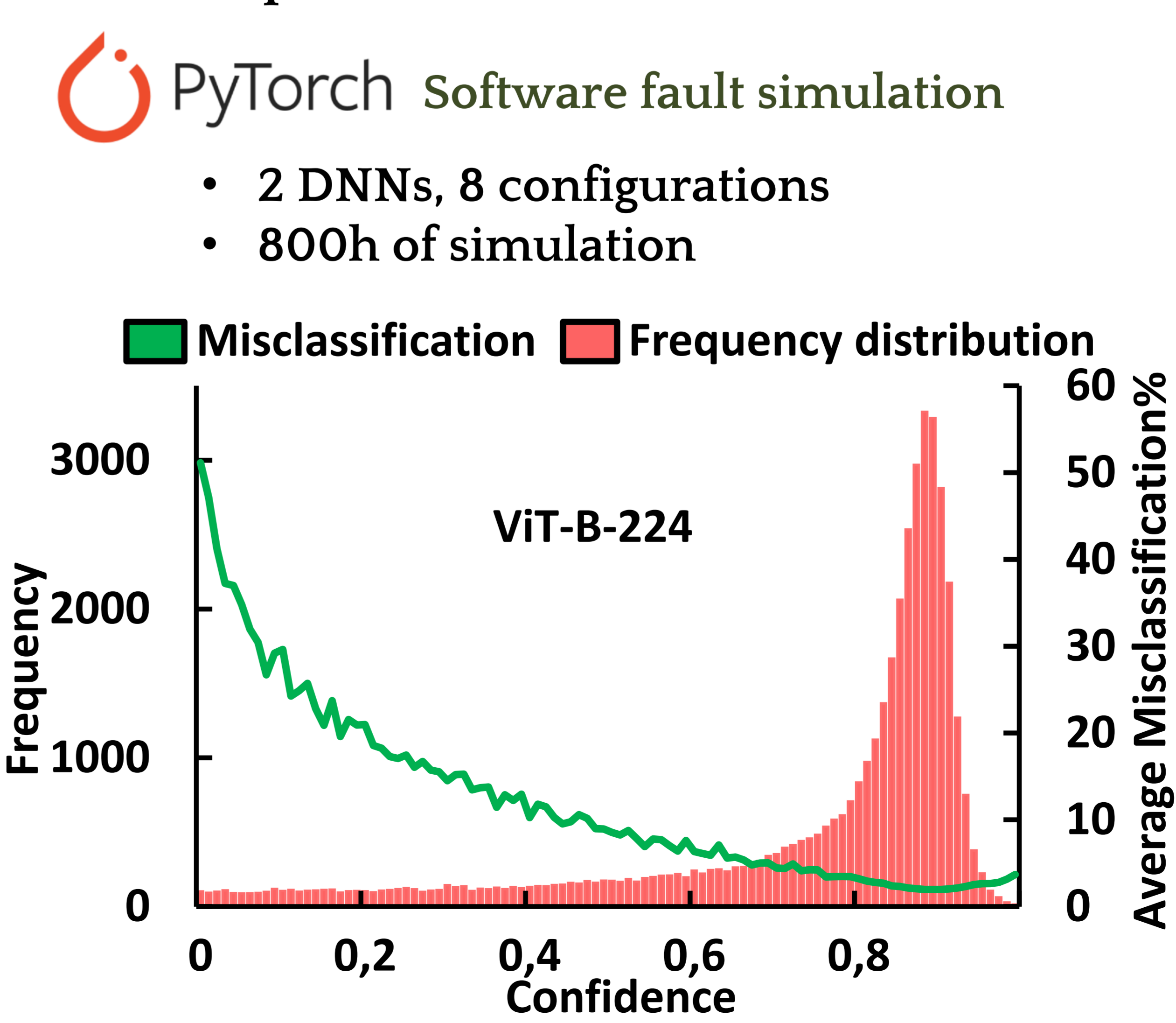
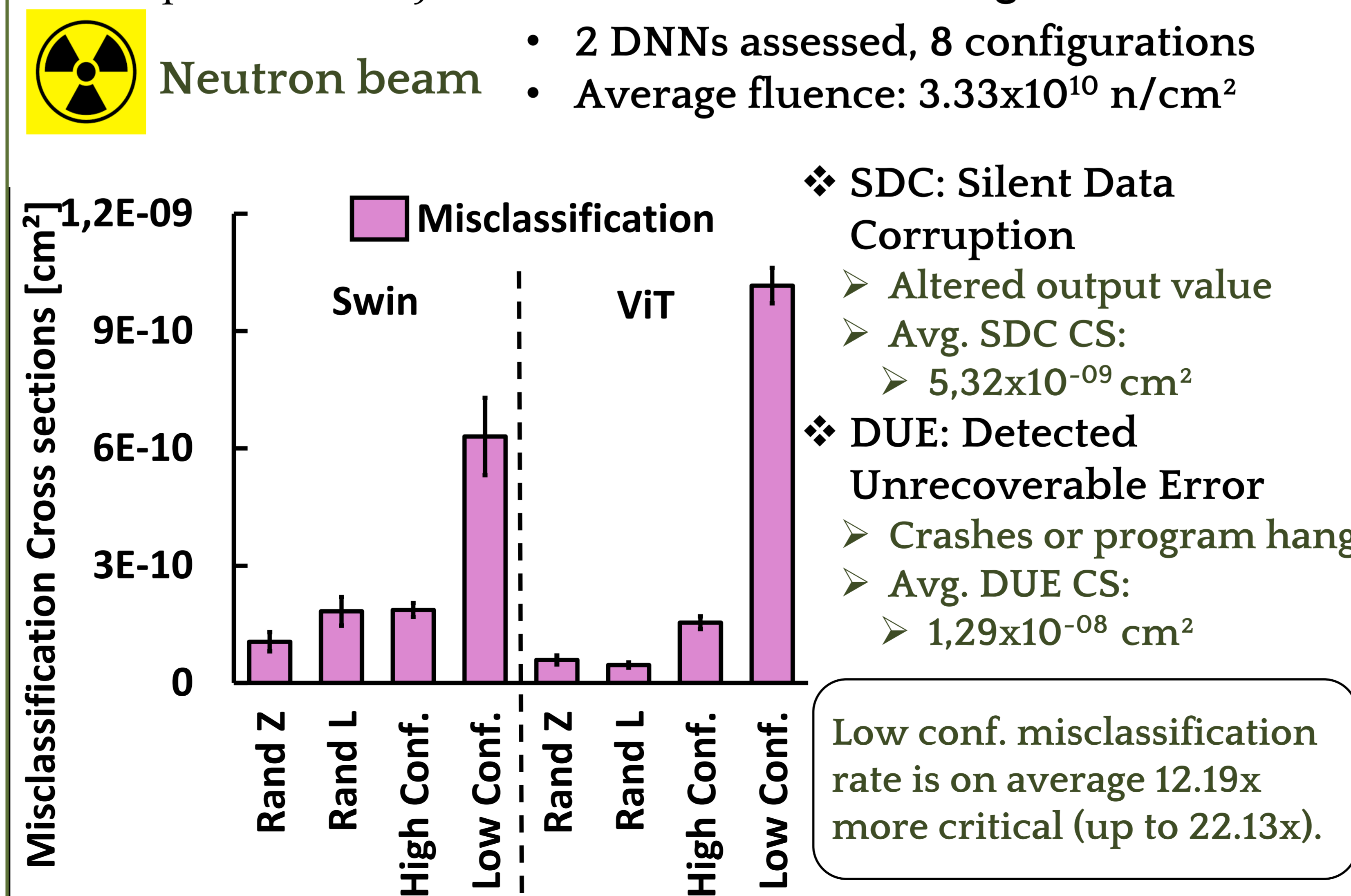


## 2. Why Select Inputs?



## 4. Results and Main Takeaways

We experimentally show that there is a **strong correlation** between the inputs and the misclassification rates.



- Main Takeaways:**
- Random input sets show much lower misclassification rates than low confidence
  - Similar trends were observed under beam experiments and software fault simulation
- Future works:**
- Explore other input selection metrics
  - Are these trends similar for other tasks like text or video processing?