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PROPOSITION DE STAGE EN COURS D'ETUDES

Référence : **Votre DDS--Numéro d'ordre**
(à rappeler dans toute correspondance)

Lieu : Toulouse

Département/Dir./Serv. : DTIS/COVNI

Tél. : 05 62 25 26 52

Responsable(s) du stage : Claire Pagetti, Noémie Cohen

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DESCRIPTION DU STAGE

Thématique(s) : Formal verification, Object detection, ML-based safety-critical systems

Type de stage : Fin d'études bac+5

Intitulé : Formal verification of high-dimensional Machine Learning (ML)

Sujet

Despite the ongoing development of certification standards for machine learning applications, there remains a critical need for methodologies to verify these models. Formal methods have historically enhanced the certification processes in aerospace projects. Nevertheless, using these methods to address complex, high-dimensional tasks like runway detection remains challenging. Specifically, the goal is to ensure that, regardless of the input images (such as Image 1), the system can accurately localize the runway. Instead of testing among all possible images, which is impossible, formal verification techniques ensure system reliability across a broad range of images.

Tasks and Accountabilities

The successful candidate will take part in the development of a software solution based on formal verification utilizing existing abstract interpretation libraries for neural networks. As part of this internship, the student will be responsible for the following key taks:

- Design and implement improvements to abstract interpretation libraries used in neural networks verification, ensuring compatibility and efficiency.
- Integrate new neural network models into the abstract interpretation library.

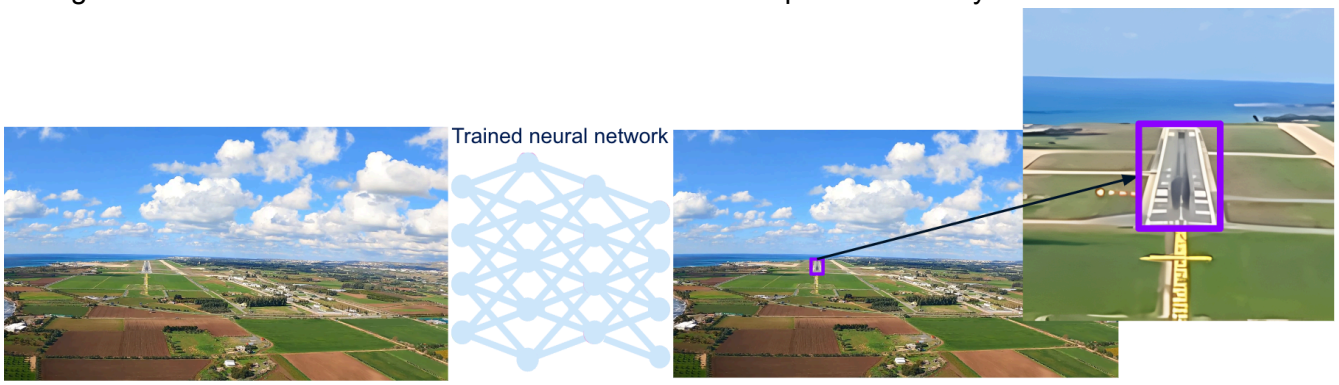

Image 1

Required Skills

You have the following training, experience and skills:

- Enrolled in Master engineering degree in IT, Software Engineering or equivalent
- Strong interest and enthusiasm towards machine learning and its application in avionics
- Knowledge in object detection
- Knowledge in formal methods and specifically in abstract interpretation is an advantage
- Computer programming skills:

○ Python
○ Computer vision
○ GPU programming experience is a significant advantage
● Autonomous & proactive
● Good interpersonal skills
● French & English advanced level

Est-il possible d'envisager un travail en binôme ? non

Méthodes à mettre en oeuvre :

Recherche théorique	~~Travail de synthèse~~
Recherche appliquée	~~Travail de documentation~~
~~Recherche expérimentale~~	Participation à une réalisation

Possibilité de prolongation en thèse :

Durée du stage : Minimum : 5 mois Maximum : 6 mois

Période souhaitée : printemps 2025

PROFIL DU STAGIAIRE

Connaissances et niveau requis :	Ecoles ou établissements souhaités :