

**CED : « Sciences et Techniques de l'Ingénieur »**

# AVIS DE SOUTENANCE

**«IKRAM BEN ABDEL OUAHAB»**

Présentera ses travaux de recherche en vue de l'obtention du  
Doctorat en Sciences et Techniques

Intitulé de la thèse :

**« Computer Vision Application Based on Artificial Intelligence Methods Applied to Malware Detection and Covid19 Social Distanciation Policy »**

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Devant le jury :

## Membres de jury

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## ABSTRACT

In recent years, the proliferation of newborn malware has posed a significant threat to various applications, highlighting the need for effective defense solutions. To combat this, researchers are increasingly focusing on developing techniques that can effectively defend against new and emerging malware trends, particularly zero-day attacks. In this thesis, we propose an Intelligent Cybersecurity Framework that employs advanced techniques to achieve a high level of security against malware attacks. The framework features a layered architecture that enables it to effectively process unknown malware samples. At the core layer, the framework employs malware visualization techniques to analyze the malicious software. The next layer employs machine learning, deep learning and Vision Transformers to classify the malware into their respective families. The final layer relies on a Malware Behavior Database to provide users with a detailed report on the malicious behavior of the given malware family. The obtained results are both efficient and fast, meeting the general requirements of cybersecurity frameworks. Otherwise, lately we have been living with a range of restrictions imposed as a result of the COVID-19 pandemic. Initially, we experienced lockdowns, followed by limited periods of outdoor activity. Then came the requirement to wear face masks to protect ourselves and others. Finally, after receiving three vaccinations, everyone is issued with a vaccination passport, also known as a health pass, which enables them to travel and access various locations. To address the challenges posed by these restrictions, we have developed a comprehensive application capable of managing and monitoring social distance, detecting facemasks, and checking vaccination passports. Our approach relies on the use of deep learning models for classification and detection. The resulting application is highly adaptable and user-friendly, making it ideal for use in a range of settings, including schools, universities, public spaces, and private buildings. To test the application's effectiveness, we employed a range of devices, including Raspberry Pi, wireless cameras, and laptops. Our tests demonstrated that the application is highly flexible, effective, and easy to use, making it an ideal tool for helping individuals and organizations comply with pandemic-related restrictions. Whether in public or private spaces, our application provides a comprehensive solution to the challenges posed by the ongoing COVID-19 pandemic.

**Keywords:** Cybersecurity, malware, deep learning, machine learning, Vision Transformers, Covid19, Computer vision, Raspberry Pi, Cancer prediction.