



TUNIS BUSINESS SCHOOL  
UNIVERSITY OF TUNIS

IT 360  
INFORMATION ASSURANCE & SECURITY

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Security Project  
Image Encryption

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# Tools and Development Phases

## 1. Tools Used:

- Programming Language: **Python**
- Integrated Development Environment (IDE): **Google Colab**

## 2. Libraries and Frameworks:

- Libraries used for Cryptography:
  - *crypto*:
    - *.Cipher.AES*: for **AES encryption**.
    - *.Util.Padding*: This module provides padding and unpadding functions, which are essential for block cipher operations that require input data to be a certain length.
    - *pycryptodome*: for **DES encryption**.
- Libraries used for Image Processing:
  - *IPython*: display images.
  - *PIL* (Python Imaging Library): adds support for opening, manipulating, and saving many different image file formats.
  - *opencv-python*: for image manipulation, including:
    - *cv2.calcHist()*: to compute histograms for images, which can be used to analyze pixel intensity distributions.
    - *cv2.matchTemplate()*: to compute autocorrelation for images.
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- Other libraries:
  - *Matplotlib*: used for visualization and plotting (*.plot .hist ...*).
  - *NumPy*: to perform a wide variety of mathematical operations on arrays.
  - *Google.colab.patches*: provides additional functionalities and utilities for working within the Colab environment, including:
    - *cv2\_imshow()*: to display images in Google Colab.
  - *Math*: used for mathematical log function.
  - *Tqdm*: used for creating progress bars and visualizing progress in loops or iterative processes
  - *Random*: for generating random numbers.

## 3- Development phases:

- A. **Develop encryption and decryption scripts for each algorithm:** Create simple and well-documented Python scripts for AES, DES, chaotic maps, ensuring clear separation of encryption and decryption logic for easy maintenance and manipulation.
- B. **Test and debug scripts:** Conduct comprehensive testing on encryption and decryption scripts with various input images to identify and resolve any issues related to algorithm implementation.
- C. **Analyze performance using image analysis functionalities:** Utilize image analysis tools such as histograms and pixel autocorrelation maps to assess the performance and effectiveness of encryption and decryption processes.