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Department of Telecoms and Networking

Course Title: Cryptography

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Assigment Title: Mini-CyberChef

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I. Introduction

1. Overview

In the field of cybersecurity of the present-day world, cryptography is a critical part that assists in data protection by encoding, encryption, and secure communication methods. However, many beginners find it difficult to understand how cryptographic operations work because they often require writing code or manually applying complex algorithms. This forms a learning barrier to those students that are only beginning to learn about cybersecurity and cryptography.

2. Problem

Simple encoding and ciphering, like Base64, Hex, ROT13, simple substitution, and more, are the most basic methods that most beginners have a hard time identifying and using. They might not have the clue of what method was applied and how to decode unknown encoded text when they are presented with unknown encoded text. Moreover, the application of cryptographic functions in the code may be difficult among the learners who are not intensive learners of programming yet.

3. Solution

In this project, Mini-CyberChef is presented, and that is a lightweight and user-friendly tool that is easy to learn because the tool is simplified. The application has a graphical interface (GUI) that allows the users to encode, decode, and analyze the text without writing any type of code. It also has a magic feature which attempts to automatically find common encodings and tries to decode them, making beginners be able to learn patterns in encrypted or encoded data. This system has a modular structure, with every encoding/decoding process being divided into easy to study modules.

4. Motivation

Mini-CyberChef was developed with the goal of providing easier and more enjoyable access to cryptography by amateurs. The project provides users with a visual representation of how text is transformed with various encoding and cipher strategies by providing an interactive and hands-on tool. This strategy promotes trial and error, develops hunch, and decreases the intricacy commonly attached to the acquisition of cryptographic functions. The tool can be a useful initial step to learners who are interested in cybersecurity, and CTF (Capture The Flag) challenges.

5. Related Cryptographic Concepts

Mini-CyberChef presents a number of some basic concepts including Base64 encoding, hexadecimal representation, Caesar/ROT ciphers, XOR, and basic decoding detection. The knowledge of these concepts forms a base to further complex concepts such as hashing, block ciphers and secure communication protocols.