PROJECT DOCUMENTATION

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COURSE: ANALYSIS OF ALGORITHM PROJECT

QUESTION 1 : TEXT COMPRESSION BY USING LEMPEL-ZIV-WELCH (LZW) COMPRESSION ?

1. **Introduction:**
   With the rise of digital data, efficient storage and transmission are crucial. Text compression reduces file size, saving space and bandwidth. The Lempel-Ziv-Welch (LZW) algorithm is a popular lossless compression method that replaces repeating text patterns with shorter codes. This project implements LZW text compression and decompression using C++.

2. **Problem Statement:**
   Large text files take up unnecessary space, slowing data transmission. To fix this, we use LZW compression to shrink file sizes while keeping all original data intact.

3. **Implementation:**
   - **Language:** C++
   - **Input:** User-provided text
   - **Compression:** LZW converts repeated text into shorter codes using a dynamic dictionary.
   - **Decompression:** Rebuilds the dictionary to restore the original text.
   - **Output:**
     1. Compressed codes
     2. Verified original text after decompression

- **Tools Used:** C++ standard libraries and a compiler

4. **Methodology:**

1. **Research:** Understand LZW and compare it to other compression techniques.
2. **Design:** Create functions for compression (lzw_compress()) and decompression (lzw_decompress()).
3. **Development:** Code in C++ and test various text patterns.
4. **Testing:** Ensure decompressed text matches original and measure compression efficiency.
5. **Documentation:** Write a report, add code comments, and suggest improvements.