МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ
РОССИЙСКОЙ ФЕДЕРАЦИИ

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ

«БЕЛГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ
ТЕХНОЛОГИЧЕСКИЙ УНИВЕРСИТЕТ им. В. Г. ШУХОВА»
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Кафедра программного обеспечения вычислительной техники и автоматизированных систем

Лабораторная работа №6

по дисциплине: Теория информации

тема: «LZW »

Выполнил: ст. группы ПВ-233

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Викторович

Белгород 2025 г.

1. *Сообщение длиной (источник Хартли) 1000 символов:*

Vuvkfruqkpbcvdinjomrmdablxpeexzhlpptvuspcvflwyijuesehyqbbgixsalnlpjljqaemj
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10000 символов:
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2. Сообщение длиной 10000 символов, источник Бернулли:

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3. Обработчик LZW:

```
def compress_text(input_data):
    encoding_dict = {chr(code): code for code in range(1, 123)}
    next_code = 256
    current_sequence = ""
    compressed_codes = []

    for symbol in input_data:
        combined = current_sequence + symbol
        if combined in encoding_dict:
            current_sequence = combined
        else:
            compressed_codes.append(encoding_dict[current_sequence])
            encoding_dict[combined] = next_code
            next_code += 1
            current_sequence = symbol

    if current_sequence:
        compressed_codes.append(encoding_dict[current_sequence])

    return compressed_codes

def decompress_data(compressed_data):
    decoding_dict = {code: chr(code) for code in range(1, 123)}
    next_code = 256
    decompressed_text = []
    previous_code = compressed_data.pop(0)
    decompressed_text.append(decoding_dict[previous_code])

    for current_code in compressed_data:
        if current_code in decoding_dict:
            decoded_sequence = decoding_dict[current_code]
        decompressed_text.append(decoded_sequence)
        decoding_dict[next_code] = decoding_dict[previous_code] +
decoded_sequence[0]
        next_code += 1
        previous_code = current_code

    return ''.join(decompressed_text)

# Основной процесс
text = input('Введите текст для сжатия\n')

compressed_result = compress_text(text)
original_length = len(text)
compressed_length = len(compressed_result)
compression_ratio = original_length / compressed_length

print(f'Исходная длина: {original_length}')
print(f'После сжатия: {compressed_length}')
print(f'Коэффициент сжатия: {compression_ratio:.2f}')
```

Источник Хартли:

```
C:\Users\admin\PycharmProjects\pythonProject4\.venv\Scripts\python.exe C:\Users\admin\PycharmProjects\pythonProject4\main.py
Введите текст для сжатия
Vuvkfruqkpbcvdinjomrmdablxpeexzhlpptvuspcvflwyijuesehyqbbgixsalnlpjljqaemjhelxogcofyjyulccfoicuufkiqzboxlbdeahchchrwrphgjiwvgu
Исходная длина: 1000
После сжатия: 727
Коэффициент сжатия: 1.38

Process finished with exit code 0
```

```
C:\Users\admin\PycharmProjects\pythonProject4\.venv\Scripts\python.exe C:\Users\admin\PycharmProjects\pythonProject4\main.py
Введите текст для сжатия
tjbvzdfalpmplrscompmvbpbsbyaqjseviwnlbsydjkuwackcztbtllysochkviswlzzghefaqjckxhjgcmifvpscqvosrvcesaqnylktwaypdvgrtgmctrgacnfyoi
Исходная длина: 10000
После сжатия: 5081
Коэффициент сжатия: 1.97

Process finished with exit code 0
```

Источник Бернулли:

```
C:\Users\admin\PycharmProjects\pythonProject4\.venv\Scripts\python.exe C:\Users\admin\PycharmProjects\pythonProject4\main.py
Введите текст для сжатия
nwnohsgtubgnrtaerttnnqtishtecyaedntifhlttteaemosiswttoesheeieeusmuixdlataystoahdtfzonoahntigttdjlclekyaaolnfvreznuwsajueirenmkrpt
Исходная длина: 10000
После сжатия: 4699
Коэффициент сжатия: 2.13

Process finished with exit code 0
```

4. Исследовать зависимость коэффициента сжатия от длины сообщения и его принадлежности к различным источникам.

Коэффициент сжатия выше у сообщения большей длины, также сообщение по источнику Бернулли было закодировано с большим коэффициентом сжатия.

Вывод: я изучил обработчик LZW и реализовал его программно.