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| CS314: Data Compression | L | T | P | Nil |
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Course Objective: To study various data/image compression techniques in detail.

| S. No. | Course Outcomes (CO) |
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| CO1 | Apply lossless and lossy compression techniques and understand performance measures. |
| CO2 | Implement Huffman coding and its applications in various compression scenarios. |
| CO3 | Utilize arithmetic coding and dictionary techniques for effective data compression. |
| CO4 | Apply image compression methods and standards for efficient image and modem compression. |
| CO5 | Understand distortion criteria and quantization techniques for lossy compression. |
| CO6 | Implement vector quantization methods for improved compression efficiency. |

| S. No | Contents | Contact Hours |
|---------------|--|----------------------|
| UNIT 1 | Introduction: Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes. | 8 |
| UNIT 2 | Huffman coding: The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, encoding procedure, decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression. | 10 |
| UNIT 3 | Arithmetic Coding: Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress. | 12 |
| UNIT 4 | Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows- Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markov Compression. | 8 |
| UNIT 5 | Mathematical Preliminaries for Lossy Coding: Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization. | 6 |
| UNIT 6 | Vector Quantization: Advantages of Vector Quantization over Scalar | 4 |
| | Total | 48 |