Thesis plan for degree project

ET1464: *Degree Project in Electrical Engineering*

Thesis	Tentative title	Quality Image compression using MATLAB
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1. Introduction

Image compression plays a major role in storage and transmission due to increasing resolution of images. Without proper compression the number of images stored in either online or offline storage are reduced, and online processing of images is made difficult. The transmission of the images is also affected by the size of the images, as low-quality image transmission is an existing problem. The quality of images cannot be compromised in this process as low-quality images are not useful for studying and research purposes. Hence, proper image compression with high quality and reduced file size is required for different applications[1] [2].

Different lossless compression algorithms are used to compress different file types. Testing these different algorithms only on image files may result in good results. Transmission of the compressed images without any quality loss may reduce the compromise on image quality while streaming and playback.

2. Aims and Objectives

The main aim of this thesis is to compare the different lossless compression algorithms such as CCITT, Flate/Deflate, Huffman, LZW, RLE for effective image compression without any compromises in the quality of the image and asses the objective image quality using No Reference method using MATLAB[3] [4] [5] [6]. This compressed image is to be transmitted with the same quality obtained after compression.

The other objectives of this thesis are

1. To check whether the improvement in the compressed file size for lossless image compression and enhanced images can be for better functionality and applications.
2. To combine the improved file compression and high-quality image resolution using MATLAB.
3. To compare the efficiency of compression ratio for different compression algorithms.

3. Research Questions

1. Can the high-resolution images be compressed without major compromise on the quality by comparing different file compression algorithms?
2. Can the high-resolution image file size be reduced by using the best compression algorithm after comparison?
3. Can the image comparison to the original after compression result in the similar quality of image?
4. Provided the questions 1,2 and 3 have been answered with considerable time left, can the same compression and transmission methods be applied for video files too?

4. Method

The project will be implemented using Image Processing Techniques using MATLAB. Digital Image Processing Techniques will be used. The algorithms will be tested and compared using MATLAB coding considering different low- and high-quality images as test cases for compression and enhancement. A data base consisting of different will be used for implementing the research questions. Use of a data base will provide the flexibility to compare the work results obtained in previously implemented solutions. The image comparison between compressed and original images is also done by using MATLAB[7] [8] [9]. The images are then tested for transmission with obtained image size and quality[10].

5. Expected outcomes

The expected outcome is that one or combination of more than one compression algorithms can result in the high-resolution compressed image file. The file size can also be reduced by further implementation of combination of compression algorithms. The comparison between original and compressed image with reduced file size will result in the similar image quality. The transmission of the images will be done without any losses of image quality obtained after compression.

6. Time and Activity Plan

The completion of this project requires 440 hours of work to be done including the Planning, Research, Modelling, Execution and Documentation. This requires 43 working hours per week to complete the project.
The division of work into categories can be done as follows

1. Planning – 50 hours
2. Research – 110 hours
3. Modelling – 100 hours
4. Execution – 100 hours
5. Documentation and Revision for Presentation – 80 hours

Week	**Activity**	**Details**
Week 1	Planning for project topic	The thesis project topic is searched with related previous works regarding the topic
Week 1	Planning for proposal	The project plan proposal is prepared and sent to the supervisor and examiner.
Week 1	Planning for final thesis proposal	Meetings with both supervisor and examiner regarding the project proposal.
Week 2	Planning	Making the required changes in project plan as suggested by the supervisor and submitting the project proposal
Week 2	Research with literature review	Start working on the project and by gathering relation information by research.
Week 2-4	Research for method implementation	Gathering information and acquiring knowledge about required methods and algorithms for starting the modelling of the project.
Week 4-6	Modelling the solution	Modelling the solution using the appropriate methods obtained in the research

Week 6-8	Execution of the solution	Executing the solution that has been modelled and making required changes as per the obtained results.
Week 8-10	Documentation and Revision for presentation	Documenting the results obtained as per the research questions and the objectives. Making additional requirements to the execution if required. Preparing for the final presentation.

7. References

[1] P. Dhumal and S. S. Deshmukh, 'Survey on Comparative Analysis of Various Image Compression Algorithms with Singular Value Decomposition', *Int. J. Comput. Appl.*, vol. 133, no. 6, pp. 18–21, 2016.

[2] D. Kumar and K. Kumar, 'Review on different techniques of image segmentation using MATLAB', *Int J Sci Eng Technol*, vol. 5, no. 2, 2017.

[3] A. K. Singh, 'Implementation of Image Compression Algorithm using MATLAB', 2016.

[4] M. Sandhu, J. Kaur, and S. Kaur, 'Matlab Based Image Compression Using Various Algorithms', *Int. J. Adv. Res. Comput. Sci. Softw. Eng.*, vol. 6, no. 4, 2016.

[5] C. Solomon and T. Breckon, *Fundamentals of Digital Image Processing: A practical approach with examples in Matlab*. John Wiley & Sons, 2011.

[6] M. Shahid, A. Rossholm, B. Lövström, and H.-J. Zepernick, 'No-reference image and video quality assessment: a classification and review of recent approaches', *EURASIP J. Image Video Process.*, vol. 2014, no. 1, p. 40, 2014.

[7] Z. Li, X. Sun, and Q. Ding, 'Design and implementation in image compression encryption of digital chaos based on matlab', in *Intelligent Data analysis and its Applications, Volume II*, Springer, 2014, pp. 509–518.

[8] O. Marques, *Practical image and video processing using MATLAB*. John Wiley & Sons, 2011.

[9] K. S. Thyagarajan, K. S. Thyagarajan, K. S. Thyagarajan, and K. S. Thyagarajan, *Still image and video compression with MATLAB*. Wiley Online Library, 2011.

[10] R. Patidar and M. S. Morya, 'Performance Analysis of QoS Parameters Like PSNR, MAE & RMSE used in Image Transmission using Matlab', vol. 02, no. 12, p. 4.