Basic grouping: Groups of 2 students each: (or individual 1-member groups)

There are 5 projects. Each group will select and work on one project of choice. Grouping and choice of projects is to be done by the students on their own. No more than three groups will work on any project. Thus, you should choose your project topic as soon as possible. You are also advised to select projects based on personal (or group) interest.

For each group, assessment will be based mainly (but not only) on the two assessment pointers described below. If you wish, you could also work as an individual.

As an individual (or group), you could also suggest your own project if you have a relevant topic.

General Assessment Pointers
In general, you are required to use the paper and reported results as a starting point to develop your own algorithms. Thus, the first step could be to implement and repeat the experiments in the relevant paper. [Note: in some cases, it is not necessary to repeat the experiments in the reference paper].

The project will be evaluated on two fronts:

As a mini research project.
- Performance of the basic function required (It is often easier to relate understand performance with tables and/or graphs, rather than native descriptions.
- Effect of different parameters
- Comparative performance with other proposed methods (use tables and charts)
- Limitations of approach (as contained in the relevant paper, or based on your own observations)
- Creativity, improvements and suggestions for improvement
- Minimal description on how to run your simulation

As a prototype demo system.
- System should perform the basic functions, as may be contained in the relevant paper or report
- User interface and user-friendliness
- Web-based interface
- Programming style and creativity in programming
- Efficiency
- Implemented improvements and other suggestions
- Documentation on how the demo system is to be used

Note that the list of considerations above is meant to be indicative only and not necessarily exhaustive. Thus, you do not need to consider each and every one of them in doing the assignment. Similarly, other ideas not necessarily included in the above list will be more than welcome.

For group work, it might be helpful to divide the work such that some (perhaps, with interest in programming) will concentrate on the implementation, and the others will concentrate on the more theoretical (and research-oriented) issues. Group members will receive the same mark for the project.

The papers referenced are available in the library, and also online via IEEE Xplore.

What to submit
1. A report on your project, including details of how the above assessment pointers have been considered. The report should be no more than 8 pages, except for appendix, if needed. Descriptions beyond the 8th page will be ignored.
2. Any program source codes and executables that you might have used.

Submit your reports and codes using the usual submit command.
Project 1: Quality of Service Monitoring
Reference Paper:


Issues that might be of interest:
- Generality of the approach
- Time required for characterization
- Performance – how closely the method models the actual traffic

Project 2: Lossless Compression of Color Images
Reference Paper:


See also

Issues that might be of interest:
- Re-ordering strategy
- Use of prediction errors
- Encoding of prediction errors
- Choice of transforms

Performance measures
1. Compression ratio
2. Coding and decoding time
3. Comparative performance with other algorithms (e.g. gzip, winzip, GIF, PNG, JPEG-LS, CALIC, JPEG-lossy with maximum quality, etc).

Project 3: Error-resilient image/video compression
Reference Paper:


OR

Using the paper as a starting point, we need to perform compression of video sequences. Use the mpeg2dec program to split the three mpeg files into individual frames, and then use the uncompressed frames as the input to your compression algorithm.

Performance measures
1. Compression and decompression time
2. Memory requirement
3. Compression ratio
4. MSE, PSNR, visual quality
Other considerations

1. Effect of bit allocation policy
2. Comparative performance, using MPEG-1, MPEG-2, motion-JPEG, JPEG-LS, others.
3. Real-time compression performance

Project 4: Fingerprint Matching

Reference Paper:

Considerations: An ideal fingerprint matching algorithm should:

- Have low false acceptance rates
- Have low false rejection rates
- Take a short time

Further performance measures

1. Effect of image quality (MSE, SNR, visual quality) on the results
2. Effect of different algorithmic parameters
3. Comparative results with other algorithms
4. Improvements on basic algorithm

Project 5: Content/Context-based Image Retrieval


OR


Performance measures

- Use precision and recall as the basic performance measure
- Comparative performance of the methods
- Efficiency
- Effect of initial semantic grouping on performance

Project 6: Your own suggested project

If you have a project topic that is relevant to the course, you are free to suggest it, and we can discuss it.

Test Data

Sample test data are provided (for some projects) in the project web-directory. In most cases, the paper would have indicated the source of their test data. You could also use your own test data.