Schedule and Homework Write Ups

Schedule of Lectures (ONLINE ONLY DUE TO CONVID-19)30 Total lectures

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Topic 1: Regression Methods and Model Selection (7 lectures)
Topic 2: Dynamic Mode Decomposition, Koopman Theory, Time-Delay Embeddings (4 lectures)
Topic 3: Model Discovery (3 lectures)
Topic 4: Reduced Order Models (3 lectures)
Topic 5: Data Assimilation (3 lectures)
Topic 6: Machine Learning: Supervised and Unsupervised Learning (3 lectures)
Topic 7: Neural Networks and Dynamics (7 lectures)

Grading and Homework Write Ups

Your course grade will be determined from your homework. There will be N homeworks over the quarter. Each of the homework sets will be part of your final grade, each is equally weighted (1/N%). This homework should be written as if it were an article/tutorial being prepared for submission. I expect a high level of professionalism on these reports.

The following is the expected format for homework submission:

MAXIMUM NUMBER OF PAGES: 6 (plus additional pages for attaching your MATLAB code: Appendix B)

Title/author/abstract Title, author/address lines, and short (100 words or less) abstract.
Sec. I. Introduction and Overview
Sec. II. Theoretical Background
Sec. III. Algorithm Implementation and Development
Sec. IV. Computational Results
Sec. V. Summary and Conclusions
Appendix A MATLAB functions used and brief implementation explanation
Appendix B MATLAB codes

I will grade based upon how completely you solved the homework as well as neatness and little things like: did you label your graphs and include figure captions. EACH HOMEWORK IS WORTH 10 POINTS. Five points will be given for the overall layout, correctness and neatness of the report, and five additional points will be for specific things that the TAs will look for in the report itself. We will not tell you these things ahead of time as a good and complete report should have them as part of the explanation of what you did. For example, in the first homework, the TAs may look to see if you talked about the fact that you must rescale the wavenumbers by 2*pi/L since the FFT assumes 2*pi periodic signals. This is a detail that is important, so it would be expected you would have it. If you do, you get the point, if not, then you miss a point.

NOTE 1: The report does not have to be long. But it does have to be complete.

NOTE 2: This report is not for me, it is for you! Specifically, for the future you. So write a nice report so that you could reproduce the results if you need the methods addressed here in another year or more.

NOTE 3: The homework (as PDFs) will be turned in via the canvas class website.

A few things should be kept in mind when generating your reports:

1. Use a professional grade word processor (Latex or MSword, for example)
2. For equations: Latex already does a nice job, but in Word, use Microsoft Equation Editor
3. Label your graphs. Include brief figure captions. Reference the figure in the text.
4. Figures should be set flush with the top or bottom of a page.
5. Label all equations.
6. Provide references where appropriate.
7. All coding should be shuffled to Appendix A and B. Reference it when necessary.
8. Always remember: this report is being written for YOU! So be clear and concise.
9. Spellcheck.