EEE511 Modelling Competition
Start time: March 23, 2021, 12 noon
Finish time (submission): March 26, 2021, midnight

Refer to the **Industrial Production: Electric and gas utilities** dataset:
https://www.kaggle.com/sadeght/industrial-production-electric-and-gas-utilities
Create a time-series model to make predictions based on the given dataset.

Tasks:

You're tasked to create 3 respective hypotheses with 1) 3 free parameters, 2) 15 free parameters, 3) 75 free parameters. You're free to choose whichever regression structure (linear regression, polynomial regression, shallow/deep neural networks, with or without regularization …). Your goal is to use your models to predict electric and gas utilities production based on the given dataset.

Basis for comparing performances (for grading and for declaring winners)

1) Since we as judges don't have test data, we'll build a simple model of 3 parameters (specifically a 3-parameter polynomial hypothesis) which will be used as the truth function.
2) We'll compute the MSE between your model output and the truth.
3) The teams with the smallest MSE for the 2nd model and the 3rd model are the competition winners and each member of the team will respectively receive an extra credit of 0.5 point. If unequal contributions are noted, members with inadequate effort will not be given extra credit.

What you should report:

How you proceeded in obtaining each of the 3 models (including but not limited to the following contents):

- Data preparation
- Features used in the models
- Hyper parameters used in the models
- Stopping criteria used (MSE, gradient, number of sweeps of data, …)
- Description of the training procedure (strongly recommend using an Algorithm Box pointing to specific equations, stopping criteria, …)
- Description of a systematic approach to come up with models
- Well-designed and well-organized tables and figures to document your approaches and your results

Required submission files:

1) A report of up to 4 pages (no cover page, no over page) in IEEE double column format. However, no need to follow the typical Abstract-Introduction-Method-Results-Conclusion-References structure. Create your own structure to clearly and thoroughly summarize your approaches and results. You may consider using (some of) the above bullet items as section titles as they are sought after in the report.
2) At the end of the report, clearly identify contribution of each team member. Equal contributions from all members are fine. But a clear statement is still expected.
3) A clear readme instruction at the top of your code page about how to run and verify your code. Code should be annotated to highlight what each section is doing for verification. More specifically, we need to know how to insert our 3-parameter truth model in your code to generate truth, and how to compute MSE from your two other models (15 and 75 parameters, respectively).
4) Zip up 1) the report and 2) the code for submission (each person is required to upload a report which should be the same for all three team members).

File name convention: Team#_Compete.zip