

EE6227: Programming Assignment 1

This programming assignment offers some choices for the students to choose from. Most of the codes are available online. The final submission must include the following:

1. Descriptions about at least two algorithms used in the study. In the case of single objective bound constrained optimization, for example, basic differential evolution and an improved version can be used. Alternatively, the basic PSO with momentum term and CLPSO (or HCLPSO) can be used. **With the algorithmic descriptions, the corresponding code segments (just a small section) can be included.** Codes of CLPSO, HCLPSO and some other algorithms are available from: <https://github.com/P-N-Suganthan/CODES>
2. Total number of Fitness/objective function evaluations per run can be 50,000 for 10D problems.
3. Descriptions about the important parameters of the chosen algorithms and how they were tuned. Tuning experiments can be conducted using 5-10 repetitions, on 4-5 problems.
4. After tuning the important parameters, final runs can be repeated 20 times.
5. 10 problems can be selected (out of 25+ benchmark problems) with 10 decision variables. If a Real-world problem benchmark is used, 10 problems **with 7 or more decision variables** can be selected. Selected problems can be briefly described in a few sentences.
6. Tables of results can include mean, median, standard deviation, convergence plots, etc.
7. **Convergence plots can be included. Convergence plots show objective value (Y-axis in log scale) versus function evaluations (X-axis linear scale).**
8. Statistical testing can be conducted using Wilcoxon signed-rank test or t-test.
9. Conclusions can be made.

Suggested test problems are:

1. CEC 2017 bound constrained benchmarks
2. CEC 2017 constrained benchmark (a constraint handling method must be used too)
3. CEC 2011 Real-world numerical optimization problems (bound constrained problems)
4. CEC 2020 Real-world constrained optimization problems. (a constraint handling method must be used too)
5. **CLPSO numerical optimization problems (bound constrained problems) available from** <https://github.com/P-N-Suganthan/CODES/blob/master/2006-IEEE-TEC-CLPSO.zip>

You need to select only one of these 4 problem sets. Within the selected problem set only 10 problems with 10 (or slightly larger than 10) decision variables should be used.

https://www.ntu.edu.sg/home/epnsugan/index_files/cec-benchmarking.htm

Codes of several algorithms, benchmarks, etc. are available mostly in Matlab or C from:

<https://github.com/P-N-Suganthan?tab=repositories>

All reports should be typed and uploaded to the turnitin submission page in NTULearn. All reports must be original. Turnitin will do a similarity check (comparing with millions of documents) and highlight identical texts.

Deadline: 30 Mar 2020