CROSS ENTROPY – COVARIANCE MATRIX ADAPTATION EVOLUTION STRATEGY (CE–CMAES)

Developed by:

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Research Contribution

- **Developed Algorithm: CE-CMAES**

- **Sequential execution** of two meta-heuristic optimization methods

- **Cross Entropy (CE)[1]** Method for **Global exploration** of the search space in the initial 50% of total iterations. CE method has very fast convergence characteristic which makes it perfectly suitable for global exploration.

- **Covariance Matrix Adaption Evolution Strategy (CMAES)[2]** for **Local exploitation** of the search space in the remaining 50% of total iterations. CMAES has adaptive step-length mechanism to generate new children as compared to other methods. This property reduces the chances of algorithm getting stuck in local minima and search space is effectively locally exploited. But large size of Covariance matrix increases execution time.

- Thus, hybridization of CE and CMAES provides **better sub-optimal solutions** with large execution time.

References

1. G Rubinstein, R. Y. (1999), "The cross-entropy method for combinatorial and continuous optimization", Methodology and Computing in Applied Probability, 2, 127-190.

2. N. Hansen. (2005 Nov.). The CMA Evolution Strategy: A Tutorial [Online]. Available: http://www.lri.fr/~hansen/cmatutorial.pdf

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