



An Improved Generic Bet-and-Run Strategy with Performance Prediction for Stochastic Local Search

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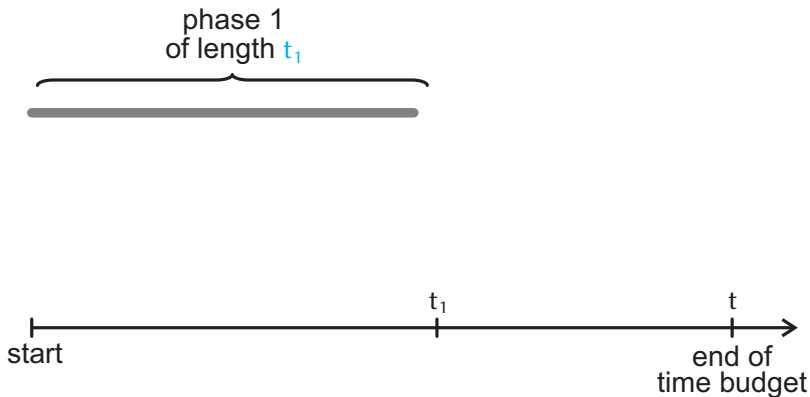
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- 1 Bet and Run
- 2 Generic Bet and Run
- 3 Experiments
- 4 Results

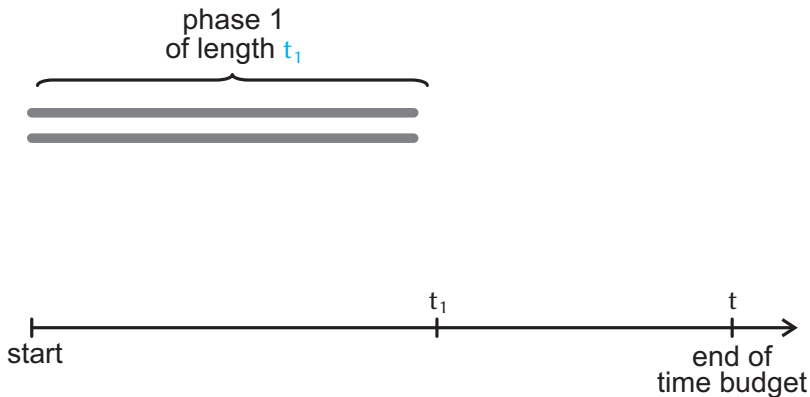


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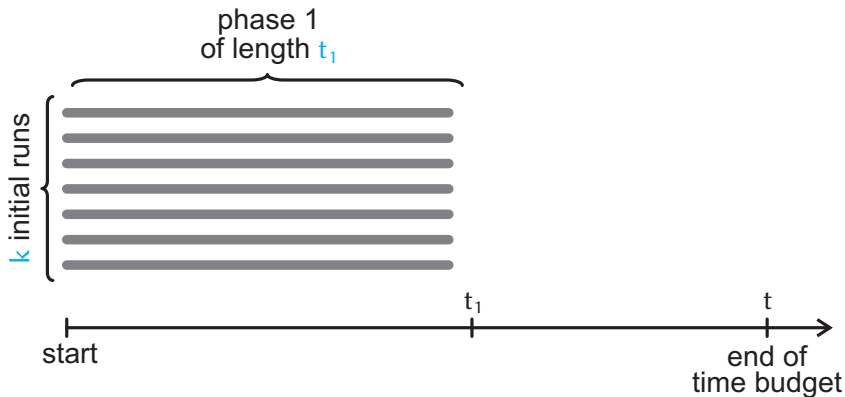
- Bet-and-Run: make good use of computational budget in optimization ^[1, 2]



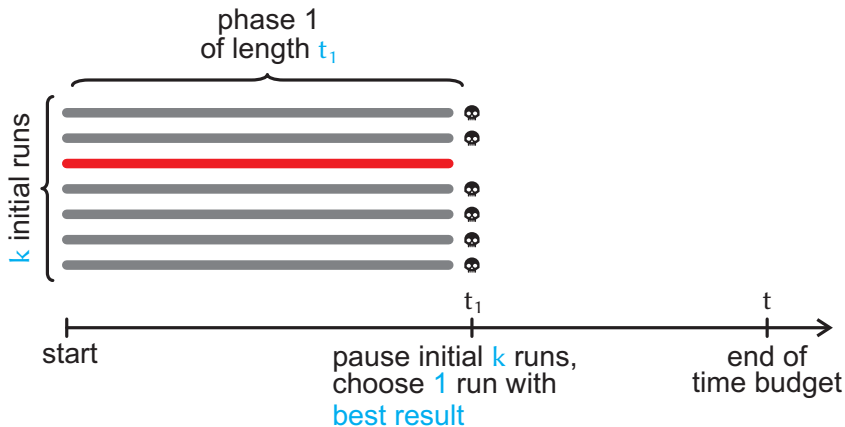
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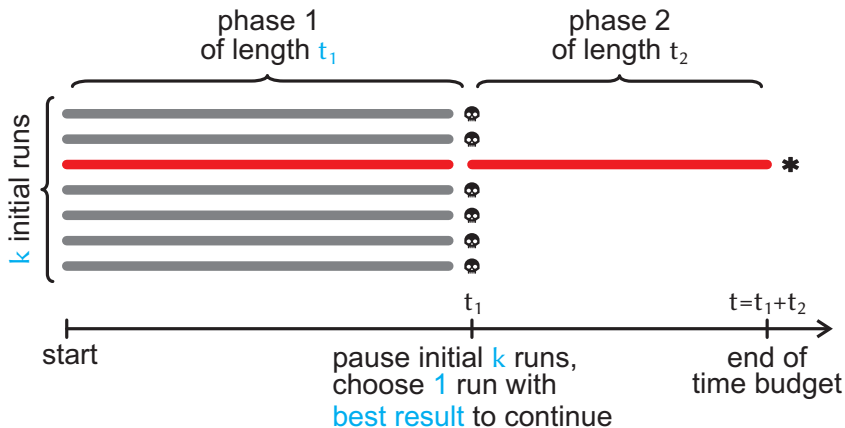
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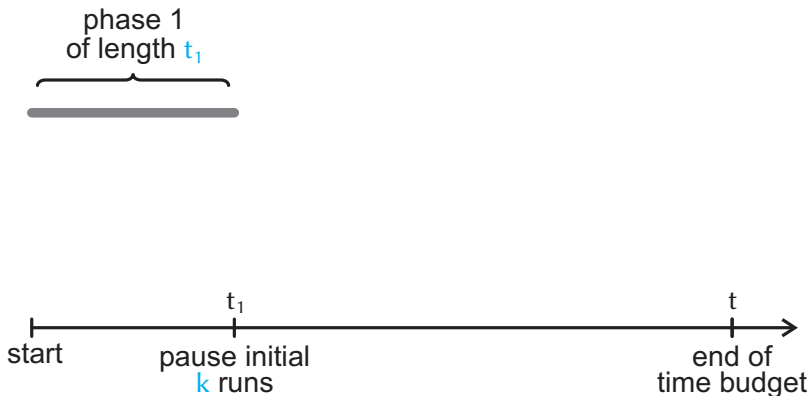
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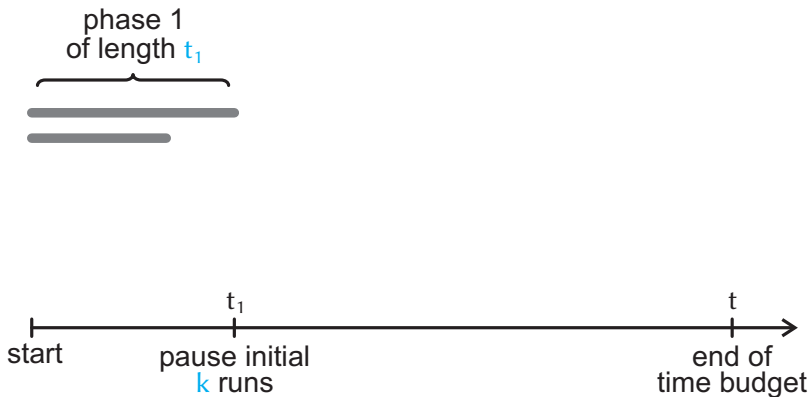
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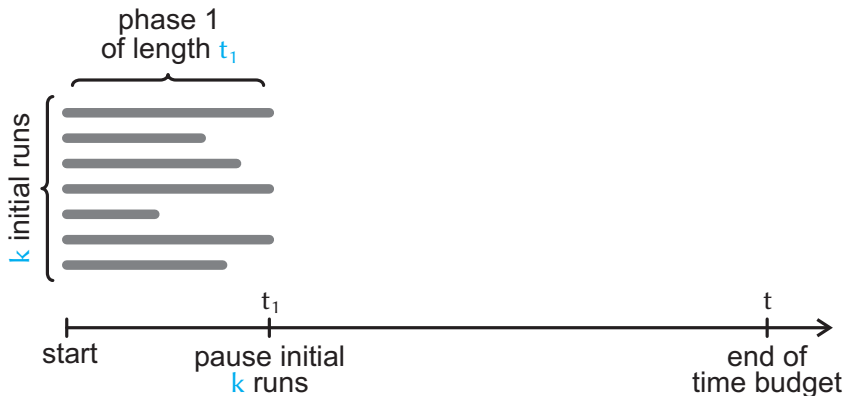
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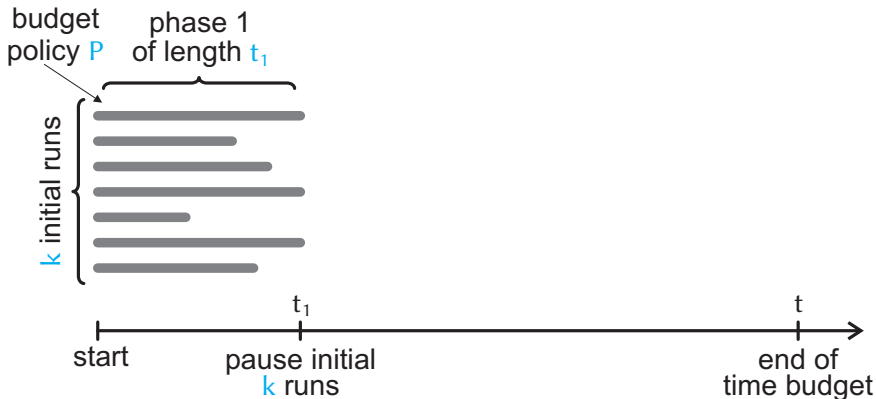
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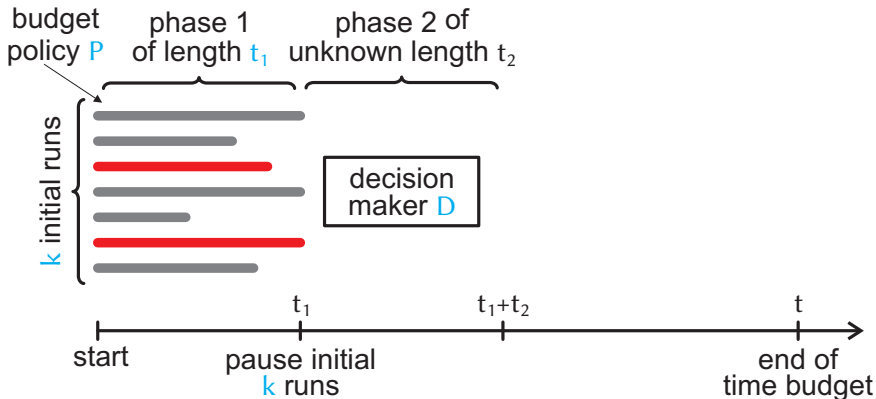
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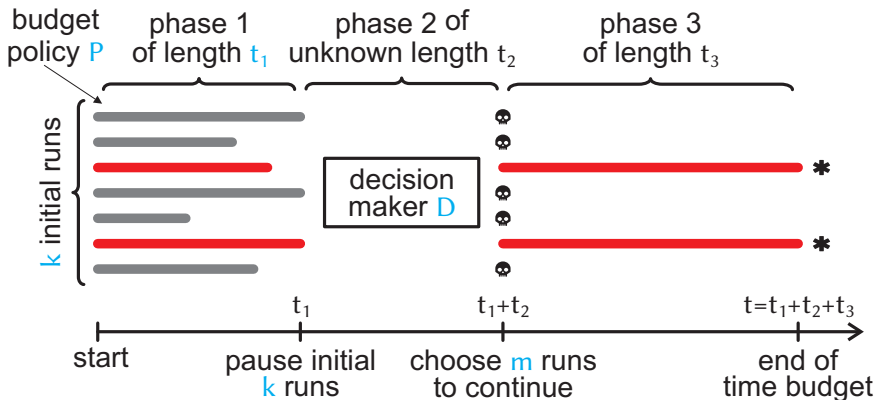
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 - Minimum Vertex Cover problem (MVC) ^[5, 6]

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- perceptron- and diminishing-returns based predictors work well

谢谢

Thank you

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1. M. Fischetti and M. Monaci. Exploiting erraticism in search. *Operations Research*, 62:114–122, 2014. doi: 10.1287/opre.2013.1231.
2. T. Friedrich, T. Kötzing, and M. Wagner. A generic bet-and-run strategy for speeding up stochastic local search. In Satinder P. Singh and Shaul Markovitch, editors, *31st AAAI Conference on Artificial Intelligence*, pages 801–807. AAAI Press, 2017.
3. Thomas Weise, Zijun Wu, and Markus Wagner. An improved generic bet-and-run strategy with performance prediction for stochastic local search. In *Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI 2019), January 27–February 1, 2019, Honolulu, Hawaii, USA*, Palo Alto, CA, USA. AAAI Press. accepted for publication.
4. D. Applegate, W. Cook, and A. Rohe. Chained Lin-Kernighan for large traveling salesman problems. *INFORMS Journal on Computing*, 15, 2003. doi: 10.1287/ijoc.15.1.82.15157.
5. S. Kadioglu, M. Sellmann, and M. Wagner. Learning a reactive restart strategy to improve stochastic search. In *Learning and Intelligent Optimization – 11th International Conference (LION 11), June 19–21, 2017, Nizhny Novgorod, Russia, Revised Selected Papers*, pages 109–123, 2017. doi: 10.1007/978-3-319-69404-7_8.
6. S. Cai. Balance between complexity and quality: Local search for minimum vertex cover in massive graphs. In Qiang Yang and Michael Wooldridge, editors, *Proceedings of the Twenty-Fourth International Joint Conference on Artificial Intelligence (IJCAI 2015)*, pages 747–753. AAAI Press, 2015. Code: <http://lcs.ios.ac.cn/~caisw/MVC.html>, accessed 2017-12-28.