

Thesis Changes Log

Name of Candidate: Nikita Klyuchnikov

PhD Program: Computational and Data Science and Engineering

Title of Thesis: Multi-fidelity classification and active search

Supervisor: Associate Professor Evgeny Burnaev

Chair of PhD defense Jury: Prof. Andrzej Cichocki

Email: A.Cichocki@skoltech.ru

The thesis document includes the following changes in answer to the external review process.

1. Added List of Figures, List of Tables, and List of Symbols.
2. Aligned style of symbols (matrices bold capital letters, while vectors by lower case bold letters).
3. [Chapter 1] Added subsections 1.1 1.2, 1.3 that introduce basic concepts (Gaussian Process; Multi-fidelity methods; Bayesian optimization, Active Learning and Active Search).
4. [Chapter 2] Added a discussion of GPs and alternative methods for multi-fidelity classification to the introduction.
5. [Section 2] Fixed non-standard notation for diag-matrices.
6. [Section 2] Changed non-standard indexes in summations as $i=1..n$ to standard $\sum_{I=1}^n$.
7. [Section 2.1 Gaussian processes for multi-fidelity modeling] added justification of Laplace Approximation usage in the context of modern research.
8. [Section 2.1 Gaussian processes for multi-fidelity modeling] added Table 2.1 with computational time of various methods.
9. [Section 2.1 Gaussian processes for multi-fidelity modeling] added Figure 2.1 to elaborate on differences among various cases of multi-task models.
10. [Section 2.2] Placed subsection "On correctness of the method" (2.2.3) after the solution (2.2.2) and before experiments (2.2.4).
11. [Section 2.2.2 Solution] Clarified the equality for the class label formulas.
12. [Section 2.2.2.3. Model selection] Added more structure and logical links to the section.
13. [Section 2.2.4.3 Comparison of methods] added margins for ROC AUC metrics to the Table 2.2 and 2.3.
14. [Section 3] Clarified what dotted lines mean above and below solid lines on relative-regret vs budget plots.
15. [Section 3.3.3 Algorithm Complexity and Regret Guarantees] Added regret guarantees.
16. [Chapter 4] Added introduction that links it with previous chapters.
17. [Section 4.1] Expanded abbreviation of SHiP and added citations for it and for the Standard Model.
18. [Section 4.1] Divided section into subsections.
19. [Section 5 Conclusion] Extended conclusions by adding some comments on future perspectives for multi-fidelity learning and active search in the context of current Machine Learning trends.
20. [Section 5 Conclusion] Added citation of VEGA paper.
21. [References] fixed titles of journals and conferences to begin in capital letters; fixed missing/wrong pages in the references.
22. [Appendix A] added margins for ROC AUC metrics to the Tables A.1-A.3.
23. Minor text corrections: grammar mistakes and typos.