Letter of Intent and Previous Work

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My interests include mathematical modeling via

convex and combinatorial optimization, graph theory and dynamic programming algorithms. Interested

in using probabilistic methods for creating suitable estimators and root cause analysis. Currently working on the following things

a) redesigning the online Fulfillment algorithm using constrain method which will replace the weighted objectives method for scalarization

b) looking into various reinforcement learning Policy Gradient algorithms such as PPO, applying those to Deployment Optimization and Fulfillment Optimization problems. For the purpose is using the gymnasium environment and stable-baselines3 library.

c) researching various algorithms for Root Cause Analysis using Bayesian inference and Probabilistic Temporal Logic. For the purpose exploring the usability of causal inference algorithms included in the packages causal-learn, causalml and dowhy.

Here are few repos representing my interests in those topics. All these repos are work in progress and will be updated periodically.

<https://github.com/dimitarpg13/root_cause_analysis_and_model_checking>

<https://github.com/dimitarpg13/reinforcement_learning_and_game_theory>

<https://github.com/dimitarpg13/graphs_and_dynamic_programming>

[https://github.com/dimitarpg13/probabilistic\_machine\_learning](https://github.com/dimitarpg13/graphs_and_dynamic_programming)

<https://github.com/dimitarpg13/optimization_classification_regression>

<https://github.com/dimitarpg13/learning_bayesian_networks>

<https://github.com/dimitarpg13/transformers_intro>

Additionally, in my free time I am looking into an implementation of *semantic simulation* for semantic search and semantic inference using reinforcement learning. Short description on Semantic Simulation can be found here:

<https://github.com/dimitarpg13/aiconcepts/blob/master/docs/SemanticStructures/SemanticSimulation.docx>

My coding experience involve python, C++, C, Java.

Here are samples of my C++ code from past endeavors:

<https://github.com/google/or-tools/compare/stable...dimitarpg13:ortools:dpg/PWL_solver_stable_py2.7_gtest_scipV6>

<https://github.com/dimitarpg13/testcode/blob/master/fraction.cpp>

<https://github.com/dimitarpg13/testcode/blob/master/fraction_mt.cpp>

<https://github.com/dimitarpg13/testcode/blob/master/fraction_bigint.cpp>

<https://github.com/dimitarpg13/cpp_testcode/tree/master/SudokuQlik/src>

And here are relevant documents to software design, architecture, coding techniques and design

patterns:

<https://github.com/dimitarpg13/BigIndex/blob/main/PresentationDGueorguiev2018.pdf>

[https://github.com/dimitarpg13/InsideTensorflow2Source/blob/master/Understanding%20Tensorflow](https://github.com/dimitarpg13/InsideTensorflow2Source/blob/master/Understanding%20Tensorflow%20%20%202%20source%20code.pdf)

[%202%20source%20code.pdf](https://github.com/dimitarpg13/InsideTensorflow2Source/blob/master/Understanding%20Tensorflow%20%20%202%20source%20code.pdf)

<https://github.com/dimitarpg13/UnderstandingPythonEcosystem>

<https://github.com/dimitarpg13/inside_cpp_object_model>

And here are few repos about C++ language details and features:

<https://github.com/dimitarpg13/cpp_effective_modern>

<https://github.com/dimitarpg13/cpp_move_semantics>

<https://github.com/dimitarpg13/cpp_templates_complete_guide>

<https://github.com/dimitarpg13/cpp_random_pieces>