Machine Learning Based Probing of Constraint Programming [using Dlib-Gecode] in the Context of Understanding Protein Folding Mechanisms – An Insight into Designing a Novel & Simple C++ Informatics Framework.

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[I] Our Idea,Inspiration & Introduction :

"In computer science,constraint programming is a programming paradigm wherein relations between variables are stated in the form of constraints."

"Machine learning is an application of artificial intelligence(AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves."

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https://en.wikipedia.org/wiki/Gecode

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http://vixra.org/pdf/1901.0133v1.pdf

https://foldingathome.org/

https://www.predictprotein.org/

https://omictools.com/blog/bioinformatics-software-for-protein-structure-prediction

https://www.science.co.il/biomedical/software/Protein-tools.php

https://zhanglab.ccmb.med.umich.edu/QUARK/

https://foresight.org/atomically-precise-protein-folding-software-aids-nanotechnology/

https://www.rosettacommons.org/

https://www.nature.com/articles/srep28268

https://www.eurekalert.org/features/doe/2004-12/ddoe-tao122204.php

http://dav.lbl.gov/archive/Research/ProteinShop/index.html

https://www.sbir.gov/sbirsearch/detail/1031975

[II] ML+ Constraint Programming Based Informatics Framework :

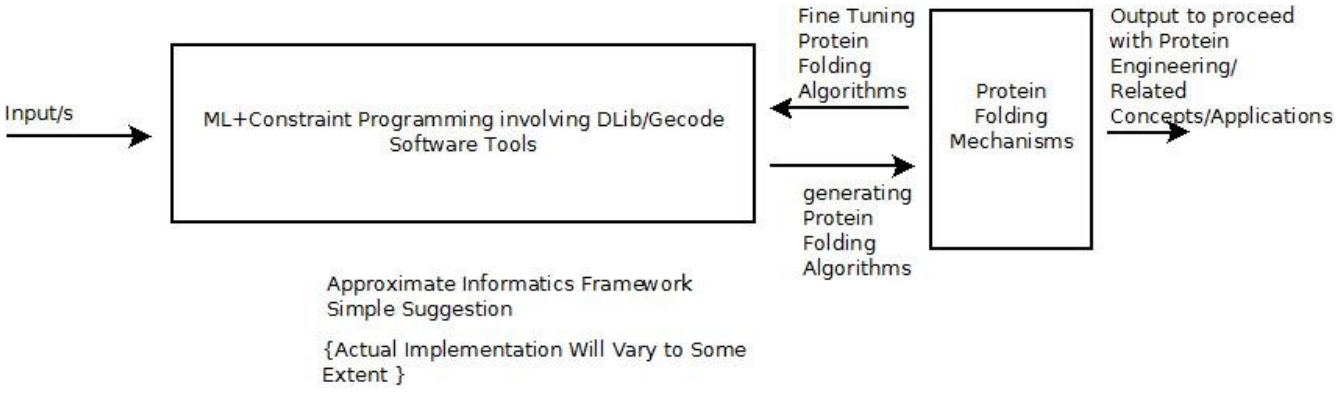

Figure I – Our Idea & Suggestion.

[III] Specific Information on Mathematics & Software Used :

http://www.ps.uni-saarland.de/Papers/abstracts/tackDiss.html

Speeding up constraint propagation. Christian Schulte and Peter J. Stuckey, In Wallace, 2004, pages 619–633.

Compiling and Executing Declarative Modeling Languages to Gecode. Raffaele Cipriano, Agostino Dovier, Jacopo Mauro. Conference: International Conference on Logic Programming/Joint International Conference and Symposium on Logic Programming - ICLP(JICSLP), pp.744–748, 2008

Monadic Constraint Programming with Gecode. Pieter Wuille, Tom Schrijvers. Proceedings of the 8th International Workshop on Constraint Modelling and Reformulation pages:171-185. International workshop on Constraint Modelling and Reformulation. Lisbon, 20 September 2009.

A hybrid solver for large neighborhood search: Mixing Gecode and EasyLocal++. Raffaele Cipriano, Luca Di Gaspero, Agostino Dovier. Conference: Hybrid Metaheuristics - HM, pp.141–155, 2009. DOI: 10.1007/978-3-642-04918-7_11

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http://math.mit.edu/classes/18.417/Slides/HP-protein-prediction.pdf

https://dash.harvard.edu/bitstream/handle/1/10382938/1211.3422v1.pdf?sequence=1&isAllowed=y
https://www.proteinqure.com/files/proteinqure_qaoa_protein_folding.pdf

https://www.ibm.com/support/knowledgecenter/en/SSSA5P_12.7.0/ilog.odms.ide.help/OPL_Studio/opllanguser/topics/opl_languser_app_areas_CP_what.html

https://www.ibm.com/support/knowledgecenter/en/SSSA5P_12.7.0/ilog.odms.ide.help/OPL_Studio/opllanguser/topics/opl_languser_app_areas_CP.html

https://www.expertsystem.com/machine-learning-definition/

https://towardsdatascience.com/machine-learning/home

https://www.sas.com/en_in/insights/analytics/machine-learning.html

Open Source Scientific Software Used :

"**Dlib** is a modern C++ toolkit containing machine learning algorithms and tools for creating complex software in C++ to solve real world problems. Please See - **http://dlib.net** for the main project documentation and API reference."

"**Gecode** is an open source C++ toolkit for developing constraint-based systems and applications. Gecode provides a constraint solver with state-of-the-art performance while being modular and extensible."

[a] https://www.gecode.org/

[b] http://dlib.net/

[c] https://github.com/davisking/dlib

[d] https://www.gecode.org/doc-latest/MPG.pdf

[e] https://github.com/ampl/gecode

[f] https://imada.sdu.dk/~marco/DM826/Slides/dm826-lec4.pdf

[g] Davis E. King. Dlib-ml: A Machine Learning Toolkit. Journal of Machine Learning Research, 2009.

[IV] Acknowledgment/s :

Special Thanks to all who made this happen.Non-Profit Academic R&D.

[V] References :

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3009511/

[2] http://web.csulb.edu/~tebert/teaching/lectures/551/bioinformatics/bioinformatics.pdf

[3] https://pdfs.semanticscholar.org/ef0f/4e61d18d363e0f447d28bd7a931f158c67ba.pdf

[4] http://www2.unipr.it/~dalpalu/papers/bioconcur04.pdf

[5] http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.212.6184&rep=rep1&type=pdf

[6] http://www.bioinf.uni-freiburg.de/Publications/Backofen:PSB98.ps.gz

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[8] https://www.princeton.edu/~fhs/paper199/paper199.pdf

[9] http://www7.inra.fr/mia/T/degivry/Schiex14a.pdf

[10] https://userweb.fct.unl.pt//~a4338/pdfs/LKPB-Constraints-7-02.pdf

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[13] http://bioinformatics.bc.edu/clotelab/FCCproteinStructure/revision26may2010/diff.pdf

[14] http://contraintes.inria.fr/~demaria/publication/protein_folding.pdf

[15] https://www.gecode.org/publications.html

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