The Bio-inspired Computation (C-Bio) Group is at the Computer science Department of Federal University of Paraná and invests in formation of qualified researchers and development of research projects. The C-Bio research in computational techniques inspired in Nature with the objective of the development of intelligent systems that imitate aspects of the observed behavior, such as: learning, perception, reasoning, evolution and adaptation. The main interest areas of the group are: Learning of Machine, Bioinformatics, Evolution Computation, Collective Intelligence, Intelligent Mining of Data and Systems, among others.

Some of the current projects are:

* Multi-Objective Particle Swarm Optimization algorithms (MOPSO) and techniques for dealing with Many-Objectives problems. This project focuses in the study of the behavior of MOPSO algorithms in many-objective problems. Different many-objective techniques have been proposed in the literature but few of them have studied the MOPSO behavior. The goal of this project is to study these issues and eventually to propose a technique most suitable for MOPSO. The project includes different empirical analysis to identify the influence of the techniques on the convergence and diversity of MOPSO algorithms using different many-objective problems. The experimental results are compared applying a variety of quality indicators and statistical tests.
* A Symbolic Fault Prediction Model Based on Multi-objective Particle Swarm Optimization. In the literature the fault-proneness of classes, methods or modules has been used to devise strategies for reducing testing costs and efforts. In general, fault-proneness is predicted through a set of design metrics and, most recently, by using Machine Learning (ML) techniques. However, some ML techniques can not deal with unbalanced data, characteristic very common of the fault datasets and, their produced results are not easily interpreted by most programmers and testers. Considering these facts, this project introduces a novel fault prediction approach based on Multi-objective Particle Swarm Optimization (MOPSO). Exploring Pareto dominance concepts, the approach generates a model composed by rules with specific properties. These rules can be used as an unordered classifier, and, because of this, they are more intuitive and comprehensible. Different experiments will be accomplished, considering respectively fault-proneness of classes and methods.
* ***Multi-Objective Particle Swarm Optimization applied in unstructured networks. This project aims to use P2P networks whose nodes are running multi-objective PSO algorithms. This study involves three aspects: 1) the spread of the topology between the nodes, 2) the implementation of optimization itself, and 3) the coordination of the trading activity of the optimization parameters needed between those involved nodes. Thus, we obtain a distributed optimization where you can take advantage of the features of this environment. Such characteristics as fault tolerance, scalability and load balancing are explored to obtain better results from problems with many objectives with regard to the quality of results and time to solve them, because the activity can be performed simultaneously in several nodes independently.***