1135-90-2501 **Nandini Rakala*** (nrakala2015@my.fit.edu), Department of Mathematical Sciences, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901, **Munevver Mine Subasi** (msubasi@fit.edu), Department of Mathematical Sciences, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901, and **Ersoy Subasi** (esubasi@fit.edu), Department of Engineering Systems, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. *Multi-Objective Extension to Logical Analysis of Data and Its Applications in Medicine.*

Logical Analysis of Data (LAD) is a classification method based on combinatorics, optimization, and theory of Boolean functions. The recent medical applications of LAD provide excellent solutions to medical problems using clinical, genomic, and proteomics datasets. The key ingredient of LAD is the identification of patterns, distinguishing between disjoint subgroups of observations. We propose an algorithmic approach based on multi-objective optimization to generate Pareto optimal LAD patterns. Given a binary data $\Omega = \Omega^+ \cup \Omega^-$, where $\Omega^+ \cap \Omega^- = \emptyset$, a pattern P is a subcube of $\{0,1\}^n$, where n is the number of features in the dataset: $P = \bigwedge_{j \in N_P} x_j$, where $N_P \subseteq \{1, \ldots, n\}$ and $x_j \in \{0,1\}$. We define a pattern P^* to be strong (strict) Pareto optimum for the multi-objective problem iff there is no other pattern P such that $Cov(P) \subset Cov(P^*)$, where $Cov(P) = \{x \in \Omega : P(x) = 1\}$. P^* is weak (non-strict) Pareto optimum iff $Cov(P) \subseteq Cov(P^*)$ for some pattern P. The proposed approach identifies the set of strong/weak Pareto optimum patterns to predict slow and rapid progressions of chronic kidney disease patients in African-American Study of Kidney Disease genomic data. (Received September 26, 2017)