A review on multi objective optimization problems and advancement on its solutions

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Abstract

A plenty of literatures are available for finding solution of optimization problem of single objective. Very few literatures are available for finding solution of optimization problem with multi objective optimization. Many researchers analysing multi objective problems by treating as single objective, keeping rest of variables as constant. With the tremendous rise of innovations in evolutionary computation, that has added feathers to Multi Objective Optimization techniques.

Keywords: Multi Objective Optimization Problems (MOOP); Pareto solution

1. Introduction

Real world problems involving several conflicting objectives must be simultaneously optimized in order to get satisfactory result. To optimize conflicting objectives in MOOPs as Many works have been satisfactorily done in the literature for single objective problems using evolutionary computation but A few works are done for multi objective problems using evolutionary computation. To identify pareto solution which will be good approximation to fit for MOOPs

To determine the accurate solution of our multi objective problems involving much more complexity. To determine best result from the pareto optimal space comparing other developed methods. To optimize many objectives simultaneously emphasizing objective of importance

Seth et al. [1] examined numerical solution of unsteady MHD natural convection flow of a viscous, incompressible, electrically conducting and heat absorbing fluid past an impulsively moving vertical plate with ramped temperature embedded in a porous medium in the presence of thermal diffusion is carried out. They conclude that magnetic field and heat absorption tend to retard fluid velocity whereas thermal buoyancy force and thermal diffusion have reverse effect on it and thermal diffusion tends to enhance fluid temperature whereas heat absorption has a reverse effect on it. Mahato et al. [2] have considered MHD flow and heat transfer of nanofluid over a stretchable surface with melting, where chemical reaction effects discussed. Such nanofluid flows find applications in heat transfer processes, pharmaceutical processes, domestic refrigerators, heat exchanger, engine cooling, vehicle thermal management etc. Heat radiating, electrically conducting, incompressible, steady flow of a viscous and chemically reacting nano-fluid past a stretching sheet, with melting, in the presence of an applied transverse magnetic field, examined by Mahato et al. [3]. Seth et al. [4] have discussed the effects of hall current and rotation on steady MHD Couette flow of Class-II of a viscous, incompressible and electrically conducting fluid in the presence of a uniform transverse magnetic field. Here also derived some expressions for shear stress at the lower and upper plates due to primary and secondary flows and mass flow rates in the primary and secondary flow directions. Seth et al. [5] have investigated the unsteady hydromagnetic Couette flow of a viscous, incompressible and electrically conducting fluid between two infinitely long
parallel porous plates, taking hall current into account, in the presence of a transverse magnetic field. Seth et al. They have concluded that the Hall current tends to retard fluid flow in the primary flow direction throughout the channel and fluid flow in the secondary flow direction in the upper half of the channel. Magnetic field tends to accelerate fluid flow in both the primary and secondary flow directions. Similarly Das et al.[6], Ray et al.[7], Kanungo et al.[8] and Mishra et al.[9,10] have studied the effects of different flow parameters on flow and heat transfer process of fluid flow. In their study they have kept all other parameter fixed except varying single parameter. So though those are multi objective problems but are treated as single objective to analyze the solutions.

Mohapatra et.al.[11] have studied the Equalization of communication channels problem using Genetic Algorithms (GA) that is more advantageous as compared to Radial Basis Function Neural Network (RBFNN). Siddique et al. [12] have used integration of kernel principal component analysis, support vector machine with teaching learning based optimization algorithm for forecasting model of stock market. Samantara [13] has developed a model for construction of functions, out of the given dynamic data by using neural network method. He has updated the parameters whenever there is change in data set. Samantara et.al.[14,15] have analyzed stock market forecasting problems using machine learning techniques. Nanda et.al [16-23] have analyzed the multi optimization problems using different machine learning algorithms like Classification rule mining algorithm, Ant colony Optimization and so on. Pattanaik et.al[24,28] have analyzed the classification problem for Breast cancer detection considering multiple criterias. Siddique et al.[25,26,29] have analyzed stock market index using machine learning algorithms. Mishra et al.[27,32,33,37-39] have studied auto desk modeling for satellite cities, Labour issues and urban flooding using evolutionary computations. Mohapatra et al.[30] have done intensive study in automated invasive cervical cancer disease detection using deep learning techniques. Behera et al.[31] have analyzed vertical multistoried structures over incompetent soils taking in account of multiple factors. Jagadeesan et al.[34] have worked on Smart Medicine Assistive System for Patients using machine learning techniques. Nanda et al.[16] have analyzed the optimization problem using different machine learning algorithm like Classification rule mining algorithm, Ant colony Optimization and so on.

2. Conclusion

In this paper the different types of optimization problems have been studied starting from single optimization to multi optimization problems. It is very much difficult to handle multi optimization problems precisely. Using of machine learning methods can give accurate results some extent.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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