A Study on Optimization of Transformer Design and Analyzing results using artificial intelligence Techniques

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ABSTRACT: ***At the heart of electrical transmission and distribution networks are transformers. The aim of the design of transformers is to obtain the dimensions of all parts of the transformer in order to supply the manufacturer with this info. It is important to build the transformer in anIt is economically feasible, has low weight, small scale, and good performance and should meet all of the requirements at the same time. Limits set by international norms. Many researchers have used transformer Artificial Intelligence (AI) techniques for Optimization of Architecture (TDO) and Review of results.The true potential of AI techniques for TDO is, however, yet to be thoroughly explored. Issues. A brief overview of transformer research and development using traditional optimization is conducted in this article. Methods, optimization techniques focused on artificial intelligence, and some of the latest bio-inspired AI techniques that can be proposed Hired for TDO issues***

KEYWORDS:Transformer design optimization, Swarm Intelligence, Genetic Algorithms, Artificial Neural Networks, and Artificial Intelligence Techniques.

INTRODUCTION

A transformer has been defined by ANSI/IEEE as a static electric device consisting of two or more windings, with or without a magnetic core, for introducing mutual coupling between electric circuits. The transformer is an electrical machine that allows the transmission and distribution of electrical energy simply and inexpensively, as its efficiency is from 95% to 99%, i.e., the transformer operates more efficiently than most of all other electrical devices. Transformers play a key role in the interconnection of power systems at different voltage levels. Without the transformer, it would simply not be possible to use electric power in many of the ways it is used today[1]. Consequently, transformers occupy important positions in the electric power system, being the vital links between power generating stations and points of electric power utilization. There are more than 400 published articles, 50 books and 65 standards in the domain of transformers, which have contributed vastly in the design improvement and performance of transformers.The design of transformers is a herculean activity in which engineers Strive to maintain conformity with the norms and standards Imposed requirements, while controlling production costs Uh, tiny. Modern transformer architecture can be planned for countries like India It plays an important role in reducing the loss of resources. THE In India, the electricity sector has an installed capacity of as of June 2014, 249.488 GW[2]. India is currently suffering from Owing to a severe shortage of capacity to produce electricity, Even though it is the fourth largest user of energy worldwide, The U.S., China and Russia. The network losses of India Compared to 23.65 per cent, including non-technical losses, the world average is less than 15%. Better Design of Transformers and the use of electrical steel of superior grade can be dramatically Reduce no-load failure, one of the primary loss components in atransformer. No-load loss can be further reduced in some cases if conventional electrical steel can be replaced with amorphous metal. The amorphous metal sheet that is used for core construction is an alloy consisting of 92% iron, 5% silicon and 3% boron. It has 70% lower no-load loss than silicon steel. The thickness of amorphous metal sheet is 0.025 mm, i.e., it is about 10 times thinner than the typical thickness of silicon sheet steel. With superior expertise in designing coupled with extensive R&D efforts, modern transformers are much smaller in size, lower in cost, and are able to promise a remarkable increase in efficiency and reduce lost energy.With the aim of providing readers with knowledge on the various Research which is being carried out in the field of Optimizing the transformer configuration, this paper is organized a The following: Section '2' specifies the basic design of the transformer Issue optimization and some of the traditional approaches Adopted for transformer architecture by researchers. '3' segment Describes the use of different methods for artificial intelligence Optimization and efficiency for transformer design Analyzing. Chapter '4' examines different modern AI techniques that can be used for issues with TDO. Lastly, segment '5' this paper finishes.

Transformer Design Optimization Problem:

The problem of transformer design optimization is based on minimization or maximization of an objective function which is subjected to several constraints. Among various objective functions the commonly used objective functions are minimization of total mass, minimization of active part cost, minimization of main material cost, minimization of manufacturing cost , minimization of total owning cost or maximization of transformer rated power[3].

Artificial Intelligence Techniques for Transformer Design Optimization:

Techniques for Artificial Intelligence have been widely used to cope with the complex transformer problem, optimizing the template. This segment discusses the usage of a number of differentAI methods used for TDO problems by researchers[4].

Shuffled Frog Leaping Algorithm:

An optimization for the shuffled frog leaping algorithm is a process that is inspired by a group of frogs' actions. The population is made up of frogs that are classified into subsets which are known as memeplexes.Memeplexes of the various they are then regarded as distinct frog cultures, each of which Output, each of which performs a search locally. Within The individual frogs hold ideas, each memeplex, that can be Influenced by other frogs' ideas and formed through a Memetic Evolution Process. The hunt and shuffling locally the procedure is carried out until the conditions for convergence are metsatisfied Total[5].

Bat Algorithm:

The Bat Algorithm (BA) relies on the action of echolocation. It is shown by bats and preliminary research that this algorithm is quite Highly Promising. In bat algorithm all bats use echolocation to discriminate between food/prey and background barriers. Each virtual bat flies randomly with a velocity ‘vi’ at position (solution) ‘xi’ with a varying frequency or wavelength and loudness ‘Ai’. As it searches and finds its prey, it changes frequency, loudness and pulse emission rate ‘r’. When a bat is near the prey, loudness decreases while pulse rate increases. Search is intensified by a local random walk. Selection of the best continues until certain stop criteria are met[6].

Cuckoo Search Algorithm:

Cuckoo Search (CS) is an algorithm for optimization inspired by compulsory parasitism of the brood of certain cuckoo species by putting their eggs in other host birds' nests. In Each cuckoo lays one egg at a time, the cuckoo search method and dumps the egg in a nest chosen at random. The finest nests Eggs of good quality will carry over to the next one, Yeah. Generation. The number of hosts' nests available is set, and the host bird with a cuckoo finds the egg laid by a cuckoo with a Likelihood pa (0.1). The worst nests found (solutions) from further measurements are then omitted.For different optimization, Cuckoo search has been extended to problems and it appears that in implementations, it can outperform other metaheuristic algorithms.The Cuckoo was applied for trouble with engineering optimization, nurse Scheduling issue, Wireless Sensor Data Fusion networks, and NP-hard combinatorial optimization Problems such as problems with travelling salesmen[7].

Shuffled Frog Leaping Algorithm (SFLA):

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CONCLUSION

This article offers a summary of the literature relating to Optimization of transformer architecture using artificial intelligence the processes. Publications from different international publications Proceedings and conference proceedings were included to cover Wide selection of techniques and architecture for engineering Considerations. A brief overview of new, bio-inspired Techniques for artificial intelligence that can be employed for Problems with TDO are also discussed. This survey provides details relevant knowledge on future developments in the field of model optimization of transformers.

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