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Various PSO methods investigation in renewable and nonrenewable sources

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ABSTRACT

Optimization structures are mostly considered for resolving multi-objective difficulties similar to cost, emission, and financial load dispatch in various energy sources. Non-renewable energy sources (NRES) emit harmful gases like CO^2, and methane. which results in air pollutants, so various techniques are used in survey papers. By considering optimization techniques, the multi-objective problems are reduced in renewable energy sources (RES) and NRES. Implementing these techniques in RES and NRES will define the proper objective function. Hybrid algorithms are used for solving multi-objective problems like cost, pollutant emission, price penalty factor, valve point, ramp rates, and constraints like generator, power flow, power balance, and heat balance. A fuzzy system is used in numerous surveys for controlling purpose, superiority, and efficiency over other controllers. Subsequently summarized three types of sources like RES, RES-NRES, and NRES for easy identification of techniques and problems. This study reviews various techniques and mathematical modeling of algorithms for future research.

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NOMENCLATURE

ACO	: Ant colony optimization
AEA	: Advanced evolutionary algorithm
AI	: Artificial intelligence
ANFIS	: Adaptive neuro fuzzy particle swarm optimization
ANN	: Artificial neural network
CEED	: Combined economic emission load dispatch
CEOT	: Cutting edge optimization technique
CMPSO	: Coevolutionary multi swarm particle swarm optimization
DE	: Diesel engine
DER	: Distributed energy resources
DG	: Distributed generation units
DPFC	: Distributed power flow controller

DRs	: Distributed Reactive sources
DSO	: Distribution system operator
ES	: Energy storage
ESS	: Energy storage systems
EV	: Electric vehicle
FRA	: Flow regime algorithm
GA	: Genetic algorithm
HOMER	: Hybrid optimization model for electric renewables pro
IRES	: Integrated renewable energy system
MGs	: Microgrids
MGWOSCACSA	: Modified grey wolf optimizer sine cosine algorithm crow search algorithm
MHA	: Meta heuristic algorithm
MMHA	: Modern metaheuristic algorithm
MOPSO	: Multi objective particle swarm optimization
MPPT	: Maximum power point tracking
NRES	: Non-renewable energy sources
PSO	: Particle swarm optimizer
PVES	: Photovoltaic energy systems
QCP	: Quadratic constraint programming
RDS	: Radial distribution system
RES	: Renewable energy sources
RES	: Renewable energy sources
ROA	: Rao optimization algorithm
SMO	: Social mimic optimization algorithm
TLBO	: Teaching learning-based optimization
TNPSC	: Total net present cost
UPFC	: Unified power flow controller
VPP	: Virtual power plants
WES	: Wind energy systems
WOA	: Whale optimization algorithm
WWOA	: Water wave optimization algorithm

1. INTRODUCTION

These existences, Renewable energy are picked for the intention that coal, gasoline then diesel bases remain decreasing and generate demand leads to high cost. Subsequently we need to renovation our power font by means of renewable energy source which is without restrictions accessible energy. Ozone coat is pretentious by the invention of injurious gases like CO^2 and NO, so we critical to revolution with green causes. In this assessment I partake enlightened about dissimilar varieties of renewable and nonrenewable sources through some optimization performance. Optimization Algorithm be present chosen and suitable for unraveling challenging and multifaceted complications in field of renewable and nonrenewable side. Equivalent to the UPFC and DPFC can handle all framework boundaries like line impedance, transmission point, and transport voltage. The arrangement converter of the disseminated power stream regulator utilizes the distributed FACTS (D-FACTS) idea. Its benefits are absence of moving part, ability to work unattended for extensive stretches, modular nature in which wanted current, voltage, and force level can be acquired by simple incorporation and long viable life and high dependability.

2. RENEWABLE AND NONRENEWABLE SOURCES WITH OPTIMIZATION ALGORITHM

The advanced algorithm is teaching learning-based optimization (TLBO) in renewable energy sources like three conservative thermal single wind plant and lone photovoltaic plant for calculating the combined cost-effective emission dispatch problems [1]. Dey and Bhattacharyya [2] presents distributed energy resources (DERS) microgrid for analyzing the optimal size of DERs the hybrid MGWOCSA, GWO, MGWO, SCA, PSO, CSA algorithm are compared to each other. Wolf be the leader of the entire group and other wolf are classified into alpha, beta, omega. Wang *et al.* [3] have described the environment is most important one we need to keep pollution free and it can be maintained by reducing the CEED problems. Kuma and Reddy [4] have discussed about emissions of gaseous pollution from fossil fuel is reduced by load allocation for generating units. Shilaj and Ravi [5] proposed the operational constraints and transmission side losses are minimized by using EFPA and BFPA algorithm. Nagaballi *et al.* [6] have suggest that RDS problem are solved by the concept of DG. Bouchekara *et al.* [7] have suggest nano grid including PV source, batteries, diesel generator. This work proposed the four-optimization algorithm of speed constrained multiobjective PSO (SMPSO), multiobjective PSO based on decomposition (MPSO-D), novel multiobjective PSO (NMPSO) and competitive mechanism based multiobjective PSO (CMBMPSO) in hybrid PV/battery/diesel nano grid to increase reliability to reduce the cost of the system. Rahimi *et al.* [8] have developed virtual power plants (VPP) like PV, wind PV thermal, combined heat and power, storage systems, conventional generators and boilers. Table 1 gives part knowledge about the search methods in optimization clears the complications in both renewable in addition to nonrenewable sources.

Table 1. RES & NRES with optimization algorithms

Reference	Sources	Objective
[1]	Thermal, Solar and Wind	For calculating the CEED problems Reduces the pollutant emissions
[2]	Wind and fossil fuel generators	To solving the multi objective problem
[3]	Wind, hydro, thermal and solar	For controlling the constraints emission, cost, ramp limits
[4]	Solar and Thermal	For calculating SCEED and DCEED
[5]	Solar and Thermal	For solving the optimization problems in solar & thermal
[6]	Distributed Generation (DG)	To solve problem in location and sizing of DG Reduces the active & reactive power losses. Increase voltage profile of RDS.
[7]	PV, Battery and Diesel generator	To reduce cost and increase reliability
[8]	Virtual Power Plants	To reduce wind speed uncertainty and increase profit of VPP

3. NONRENEWABLE ENERGY SOURCES WITH OPTIMIZATION ALGORITHM

The advanced meta- heuristic approach like cuckoo examine algorithm for unravel the multi objective CEED delinquent for determine the power generation problems like emission and implementing cost implements in [9]. Phulambrikar [10] implements the Jaya, particle swarm optimization in addition Bare- Born particle swarm optimization and various evolutionary algorithm for the purpose of minimization of emission and operating cost. Focus on new practice in optimal balance in fee and release lessening in thermal power plants. Generator constraints are optimized by converting the single objective function from multi objective function consuming alter price penalty factor approach because of involving water wave optimization algorithm (WWOA) [11]. Karthikeyan *et al.* [12] launch the grasshopper optimization algorithm toward determine the mutual commercial emission difficult connecting in cubic roles. In this algorithm power run limits are found out. Sarat and Sudhansu [13] they have addressed the realistic problem of EED in the power system for reducing the fuel rate and minimize environmental discharge. Tumar *et al.* [14] have developed the idea model free pid with derivative filter (PIDF) for liquid slosh compression system with PSO technique. Table 2 this provides the objective of the work in nonrenewable side and approaches used to resolve complications clears it in different way.

Table 2. Nonrenewable energy sources (NRES) with optimization algorithms

Reference	Sources	Objective
[9]	Thermal	For determine the power generation problems like emission and implementing cost
[10]	Thermal	Purpose of minimization of emission and operating cost
[11]	Thermal	To solve the CEED problems For reduce Transmission losses
[12]	Thermal	For finding CEED problems in the system price penalty factor
[13]	Thermal	For reducing the fuel cost and minimize environmental emission
[14]	Liquid Slosh Tank	To find optimal values in sum squared error (SSE) and sum absolute error (SAE)

4. RENEWABLE SOURCES WITH OPTIMIZATION ALGORITHMS

Joshi and Verma [15] implement renewable energy sources like solar and wind development as the hybrid model for challenging the complex multi-objective problems without receiving stuck in local optima. Madhumathi and Thenmalar [16] have introduced the idea of DG, ESS, DER, MG in isolated and the connected operation. Fuzzy with teaching learning algorithm (TLA) is involved here for reconfiguration, location of DG, minimization of cost and bus voltage deviation. Elattar [17] have applied the novel type of the shuffle frog leaping algorithm is also defined as altered shuffle frog leaping algorithm aimed at locating both local and global search mechanism. Yanpeng *et al.* [18] have suggest internet of things (IoT) built micro grid allowed smart structures to reach digital then automatic in reneswable side [19] have developed micro grid is a small grid which gives power for the small areas or local areas like village and commercial place.

Dey *et al.* [20] have suggested to avoid transmission losses and uninterrupted energy flow micro system is used and renewable energy sources remain recycled for reducing the emission of harmful gaseous. Phung *et al.* [21] suggested in PV system will requires the efficient management and monitoring the movements of the panel for absorption of radiation. Internet of stuffs are developed to controller besides managing the renewable sources. Moghaddam *et al.* [22] have developed renewable energy sources are used in micro grids. Solar and wind is the sources of electricity production in micro grid. Fuzzy adaptive PSO is superior, efficient than other evolutionary algorithms. Kanase-Patil *et al.* [23] have applied the IRES in clearing the energy supplement and power demand of present-day issues. Various AI algorithm are focused on the sizing of IRES in smart cities. Twaha and Ramli [24] have implement the idea of optimization for hybrid DEG for alone and grid interconnected systems. Priyadarshi *et al.* [25] have introduced the adaptive neuro fuzzy PSO (ANFIS-PSO) in hybrid MPPT techniques in solar PV power production to improve power generation. Logeswaran *et al.* [26] have discussed about the solar system in presence of MPPT and BAT optimization it will provide more efficiency. Firdaus *et al.* [27] have purposed the PV source with MPPT technique to increase PV efficiency by integrating fuzzy logic PSO (FL-PSO) method. Kaur and Bala [28] have purposed the concept different technology included for analyzing optimal location and capacity of DG units. Main problem in location of DG is multiple constraints.

Introduced the coevolutionary multi swarm particle swarm optimization (CMPSO) in distributed generators for attaining the maximum efficiency and reliability. By this location DGs and sizing in EDS is easy in [29]. Yin and Ming [30] have suggest backward learning competitive particle swarm optimization based on local search (SW-OBLCSO) is implement in IEEE 33 bus for solving overload of line, line losses, voltage problems and to minimize disordered charging of EV in the side of distributed grid. Vera *et al.* [31] have discussed about the RES issues and MG systems energy management. Lithium batteries is the best choice instead of lead acid batteries. Shaikh *et al.* [32] have invented the concept of hybrid optimization model for electric renewables (HOMER) Pro and PSO algorithm in hybrid solar PV/wind and battery sources. Abdelkader *et al.* [33] have proposed a new method to optimize the PV/Wind in hybrid energy storage system (HESs). Yaghoubi-Nia *et al.* [34] have introduced monte carlo simulation (MCS) methods for optimal location of DGs and to maintain the reliability of smart grids, protective devices (PDs). In [35], [36] have discussed about the RES into MG to reduce the pollution and increase the demand of power and real time ANN controller. Sulaimana *et al.* [37] have initiate the hybrid electric vehicle (HEV) system and efficiency of fuel cell hybrid EV (FCHEVs) is increased. IH algorithm is involved here to maintain minimum error in real time and to find the optimal values of FCHEVs, safety concerns also maintained for FCHEV system. Azad *et al.* [38] have discussed about energy consumption of people and power. Hassan *et al.* [39] have designed DG units with installation of various optimization techniques. Convergence speed is faster in computational methods in hybrid optimization techniques. Mohammed *et al.* [40] have purposed HRES like tidal/ wind/ solar/ batteries. Babu *et al.* [41] have suggest several optimization algorithms in PV panels. Population based algorithm like flow regime algorithm (FRA), rao optimization algorithm (ROA), social mimic optimization algorithm (SMO) is used to reduce the power loss%, mismatch losses, fill factor and to increase power improvement %. Bengourina *et al.* [42] have presented the PV system with Shunt Active Power Filter (SAPF) for correcting the power factor, harmonic elimination, consumption of reactive power. Khana *et al.* [43] have focused on RES than fossil fuels. Elsheikh and Elaziz [44] have developed PSO in solar energy for the optimal position of each function of parameters. Performance of PV is improved and irradiance level is adjusted. Multiobjective problems in solar is rectified by PSO algorithm. Akkar and Hussein [45] have purposed the MPPT in hybrid solar wind for maximize the solar power. Table 3 (see Appendix) explicates about the causes and systems taken to several types of problem in green energy sources.

5. CONCLUSION

In this outline of the review paper proceeding collective economic and release dispatch (CEED) complications on energy sources be situated reduced by the several optimization algorithms. Hybrid algorithms are used for solving multi-objective problems like cost, pollutant emission, price penalty factor, valve point, ramp rates, constraints like generator, power flow, power balance, heat balance. A fuzzy system is used in numerous surveys for controlling purpose, superiority, efficiency than other controllers. Subsequently summarized three types of sources like RES, RES-NRES, and NRES for easy identification of techniques and problems. After summarizing the present optimization methods and algorithms, we purposed and explained them for future research works. For future work internet of things (IoT) can be implemented in both RES & NRES for effective monitoring.

APPENDIX

Table 3. Renewable energy sources (RES) with optimization algorithms

Reference	Sources	Objective
[15]	Solar and wind	To solve multi-objective problems without getting trapped in local optima
[16]	Solar and Wind	To reduce multi objective problems like emission and generation cost Reconfiguration of IEEE 33 bus Improve flexibility.
[17]	Solar and wind	For explaining the collective heat emission and economic dispatch (CHEED) complications
[18]	Solar, Wind and Geothermal	To reach balance of supply and demand
[19]	Solar and wind	To minimizing the fuel cost and emission values. For solving CEED problems
[20]	Wind	To analyses valve point effect and ramp rates
[21]	Solar	To track the performance of photovoltaic arrays
[22]	Solar and wind	To minimalize the whole operative cost
[23]	Integrated Renewable Energy System	To increase durability of battery and increase the efficiency of power To reduce the cost of IRES sizing.
[24]	PV and Wind	To improve reliability and to reduce interruption cost. To reduce pollutant emissions.
[25], [26]	Solar	Low Total Harmonic Distortion, zero ripple output To improve power generation
[27]	Solar	To reduce power oscillation and increase PV efficiency To attain the maximum power point is very less
[28], [29]	Solar and Wind	To attain maximum efficiency and reliability To solve problems in line losses, voltage limits
[30]	Electric Vehicle	To improve convergence speed and global search To minimize disordered charging and charge cost
[31]	Distributed Energy Resources	To improve the life cycle of batteries, charging and density of energy
[32]	Solar PV/ Wind	To reduce Greenhouse gases 80%.
[33]	Hybrid Energy Storage Systems	To reduce the cost of power and improve reliability
[34]	Smart Grids	To reduce uncertainty problems of DGs and increase reliability
[35], [36]	Renewable Energy sources	To reduce Harmonics, cost Focused on challenges of RES
[37]	Hybrid Electric Vehicle Fuel Cell Electric Vehicle (FCEV)	For energy management To minimize the error in real time and for safety concerns To increase efficiency
[38]	Hydro Power	To reduce overall cost Improve power generation
[39]	Renewable sources	To increase convergence speed Power quality is improved
[40]	Tidal/Wind/Solar/Batteries	To improve reliability To reduce Total Net Present Cost (TNPC) For minimizing of fitness value
[41]	PV	To reduce % power loss, % power mismatch losses To improve % power improvement
[42]	PV	To correct power factor Reduce harmonics and consumption of reactive power Robustness
[43]	Solar and Wind	To reduce duration of time and demand of load To improve reliability and cost reduction
[44]	Solar	To adjust irradiance level. To solar performance
[45]	Hybrid Solar -Wind	To maximize power production. Avoid dropping down of system

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