

Hybrid fruit fly optimization algorithm for solving multi-compartment vehicle routing problem in intelligent logistics

Wang, C.L.^a, Li, S.W.^{a,*}

^aSchool of Business, Shandong Normal University, Ji'nan, P.R. China

ABSTRACT

The purpose of this study was to tackle multi-compartment vehicle routing problem in intelligent logistics with the fruit fly optimization algorithm (FOA). A hybrid FOA (HFOA) integrated with three local search methods (2-opt, swap and insert) was adopted to solve the multi-compartment vehicle routing problem (MCVRP) in intelligent logistics by applying discrete space optimization problems. The numerical experiments show that the HFOA algorithm has improved the performance for all proposed problems, including improving the total path length and enhancing the solution quality. The improvement rate in total path length shifts from 3.21 % at 50 customers to 9.83 % at 150 customers indicating that this HFOA is more effective in largescale. The HFOA integrated with 2-opt, swap and insertion elevates the solution quality from 11.86 % to 17.16 % displaying the advantages. The effectiveness and stability of the proposed algorithm shed new light on the routing of MCV distribution problems in intelligent logistics.

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*Corresponding author:
3472181435@qq.com
(Li, S.W.)

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Optimizacija s hibridnim algoritmom mušic za reševanje usmerjanja večprostorskih vozil v inteligentni logistiki

Wang, C.L.^a, Li, S.W.^{a,*}

^aSchool of Business, Shandong Normal University, Ji'nan, P.R. China

POVZETEK

Namen študije je bil rešiti problem usmerjanja večprostorskih vozil v inteligentni logistiki s pomočjo optimizacije z algoritmom mušic (FOA). Za reševanje problema usmerjanja večprostorskih vozil (MCVRP) v inteligentni logistiki z uporabo optimizacije diskretnega prostora, je bil uporabljen hibridni FOA (HFOA) s tremi integriranimi lokalnimi iskalnimi metodami (*2-opt*, zamenjava, vstavljanje). Numerični eksperimenti potrdijo večjo zmogljivost algoritma HFOA, vključno z izboljšanjem celotne dolžine poti in kakovostjo rešitve, za vse predlagane probleme. Pri 50 strankah je ugotovljeno skrajšanje celotne dolžine poti 3,21 %, pri 150 strankah pa 9,83 %, kar kaže, da je ta HFOA učinkovitejši v večjem merilu. HFOA z integriranimi iskalnimi metodami izboljša kakovost rešitve iz 11,86 % na 17,16 %. Učinkovitost in stabilnost predlaganega algoritma prikažeta problem usmerjanja večprostorskih vozil v inteligentni logistiki v novi luči.

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PODATKI O ČLANKU

Ključne besede:

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**Kontaktna oseba:*

3472181435@qq.com
(Li, S.W.)

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