Software for Route Optimization of Fixed-Wing Aircraft in Complex Areas

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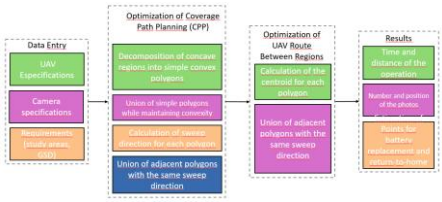
Description



This software represents a cutting-edge solution for route optimization of fixed-wing unmanned aerial vehicles (UAVs) in complex areas, with a special focus on intertidal marine regions. Traditional in-situ methods are time-consuming, laborious and hazardous, while satellite imagery lacks sufficient resolution and rotary-wing UAVs are inefficient for large-scale operations. This tool leverages advanced algorithms to deliver a highly efficient and eco-friendly alternative, optimizing resources to achieve comprehensive data coverage while minimizing energy use and environmental impact. It stands out for its adaptability, speed, and ability to evaluate various UAV and sensor combinations to identify the best configuration for specific tasks. With versatile applications in precision agriculture, surveillance, mapping, and search-and-rescue missions, the software offers significant commercialization value.

Versatile, fast, and user-friendly software: Ideal for applications in agriculture, security, mapping, and search and rescue missions, with rapid execution offering high market potential across industries.

Innovative aspects and advantages

Efficient Route Planning: Reduces UAV turns and flight distance, overcoming the limitations of fixed-wing technology.

Purpose and Innovation: The software optimizes routes for fixed-wing UAVs to monitor species in intertidal marine areas, addressing challenges of traditional methods and low-resolution satellite images.

Innovative Features: Employs optimization techniques for Coverage Path Planning (CPP) and a modified Traveling Salesman Problem (TSP) algorithm for efficient route planning and reduced UAV turns.

Versatile and Eco-Friendly Applications: Adaptable to various sectors, it minimizes energy use, supporting sustainable practices in large-scale UAV operations.

Environmentally Friendly: Optimized routes cut flight distance and energy consumption, extending battery life, reducing recharge needs, lowering carbon emissions, and promoting sustainability in UAV operations.

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Advantages Over Similar Products: Efficient computation, precise coverage, and compatibility with complex geometries make it superior to other current methods and algorithms.

Programming and Licensing: Built in Python, it uses open-source libraries (e.g., Shapely, Numpy, Matplotlib) and incorporates MIT-licensed algorithms, ensuring accessibility and adaptability.

Ease of Use: Inputs include .shp files with study area geometries, UAV parameters (speed, flight time, turning radius), and camera specifications (VFOV, HFOV, overlaps). Runs as Python scripts or a .exe file on Windows without additional software, allowing broad usability for non-technical users.

Provision of optimized routes: Total flight time, battery changes, photograph positions, minimized turns, and enhancing operational efficiency.

Commercial applications and potential users

This versatile software is a valuable tool for various industries. It optimizes UAV operations in precision agriculture, surveillance, security, mapping, environmental studies, and search and rescue missions. It allows customization based on specific UAV and sensor configurations, delivering high efficiency and detailed results. Potential users include agricultural companies, environmental researchers, mapping agencies, security organizations, and disaster response teams. It ensures reliable data collection, efficient operational planning, and effective coverage in complex or large areas. Offering a cost-effective solution to address challenges across multiple scenarios, it enhances resource management, geospatial data creation, and effectiveness in critical situations such as environmental monitoring or rapid-response rescue operations.

Intellectual property status

- Registeration number: **03 / 2024 / 1304**

Type of collaboration

Looking for industry interested in licensing or joint development of the process and/or product.

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