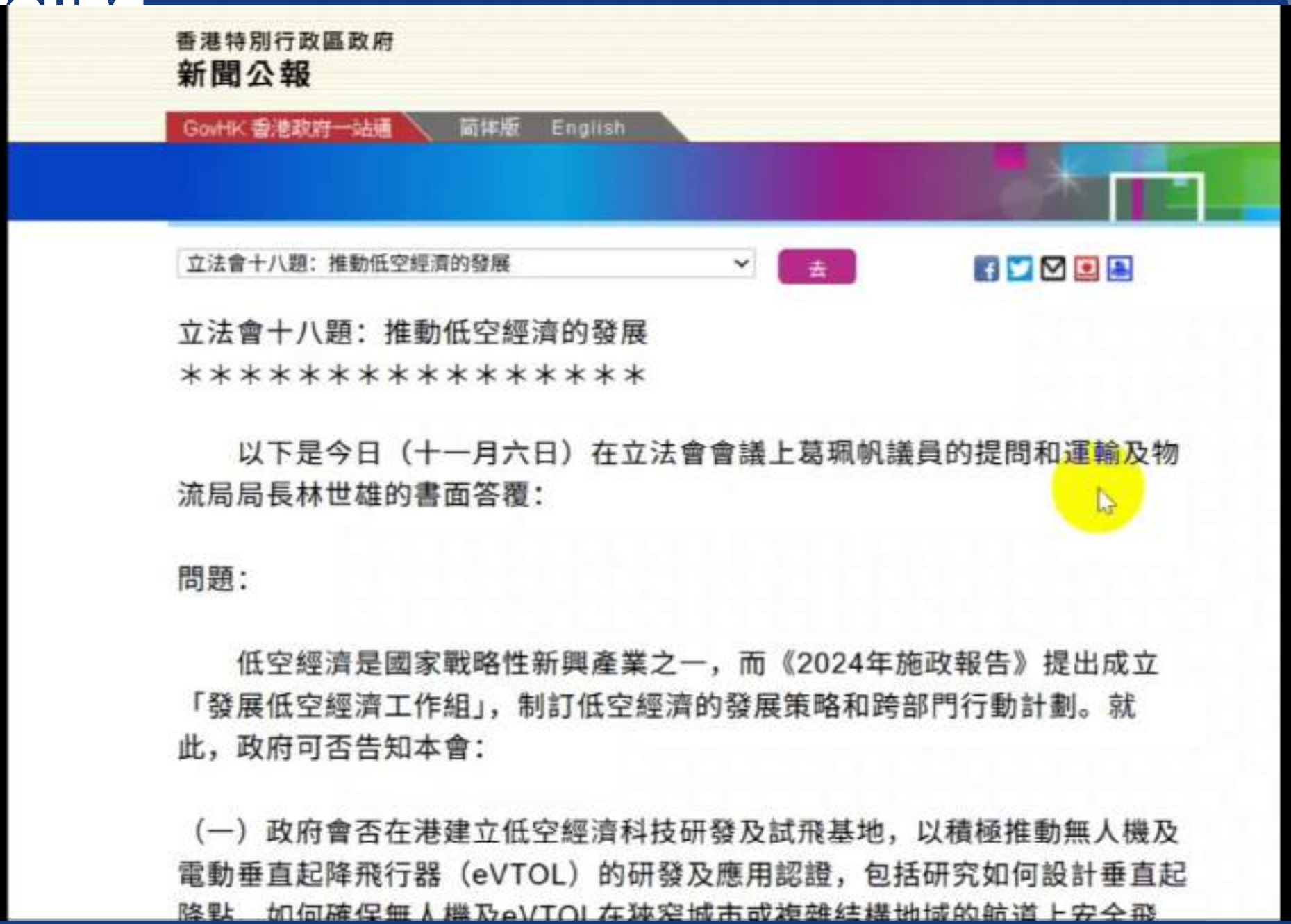
SmartRoute
低空交通網絡解決方案

Presented by GEDI (1255F)

A Solution to make Low-attitude Traffic Network regular and manageable

Background



香港特別行政區政府
新聞公報

GovHK 香港政府一站通 | 简体版 | English

立法會十八題：推動低空經濟的發展 去

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以下是今日（十一月六日）在立法會會議上葛珮帆議員的提問和運輸及物流局局長林世雄的書面答覆：

問題：

低空經濟是國家戰略性新興產業之一，而《2024年施政報告》提出成立「發展低空經濟工作組」，制訂低空經濟的發展策略和跨部門行動計劃。就此，政府可否告知本會：

（一）政府會否在港建立低空經濟科技研發及試飛基地，以積極推動無人機及電動垂直起降飛行器（eVTOL）的研發及應用認證，包括研究如何設計垂直起

Overall Strategy

Data Collection

- 3D Visualisation Map
- Road Centreline
- 3D Indoor Map
- iB1000
- Restricted Flying Zone
- . . .

Grid Coding Rules

- **Geospatial Grid Encoding Rules (GeoSOT)** GB/T 40087-2021
- **BeiDou Grid Location Code** GB/T 39409-2020

Components

- Ganos Spatial Engine
- GeoServer
- Cesium

Spatial Analysis

- Intersect Analysis
- Buffer Analysis
- Network Analysis
- . . .

Core Tech

- WebGIS
- WebGL
- GeoSOT
- A* / Dijkstra Algorithm
- . . .

SmartRoute

Function 1
3D Grid Generation

Function 2
3D Grid Coding

Function 3
3D Grid Cost Setting

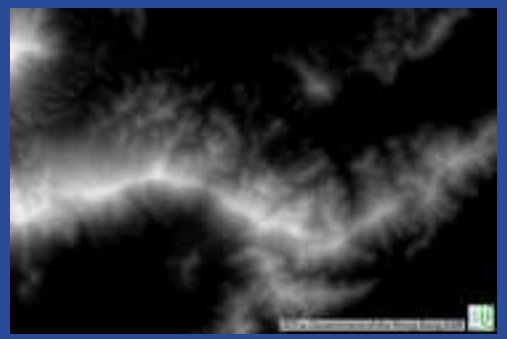
Function 4
3D Grid Path Planning

Key Spatial Data

Base

DOP5000

Building



DTM

Analysed

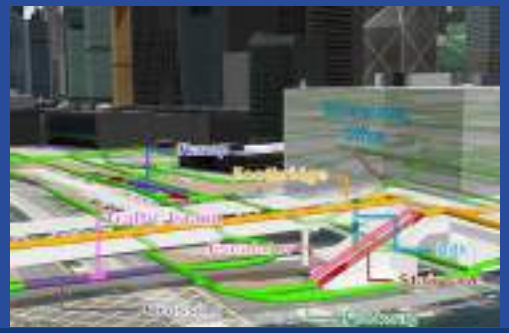
Road Centreline

Restricted Flying Zone

3D Visualisation Map

iB1000 Data

3D Indoor Map



3D Pedestrian Network

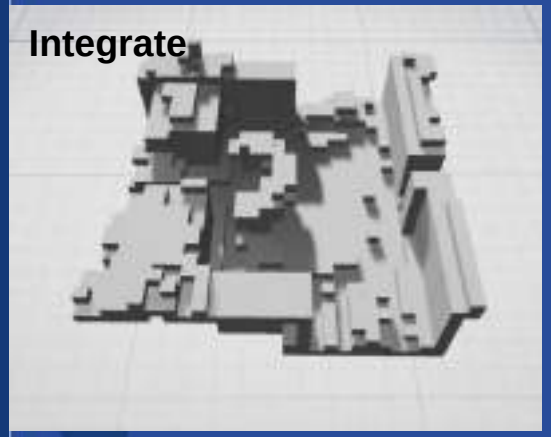
空間數據共享平台
Common Spatial Data Infrastructure

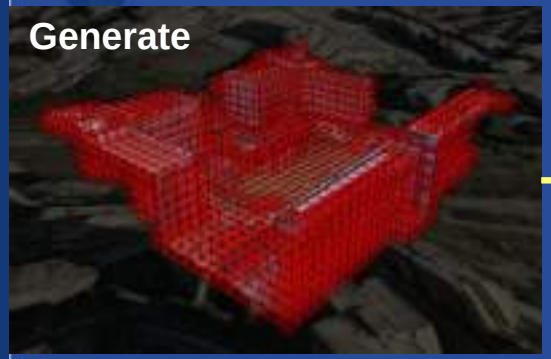
Lands Department
The Government of the Hong Kong Special Administrative Region

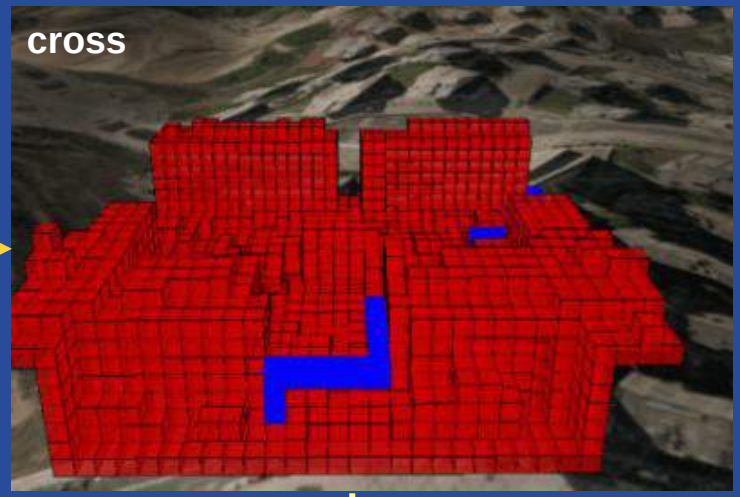
Open3Dhk

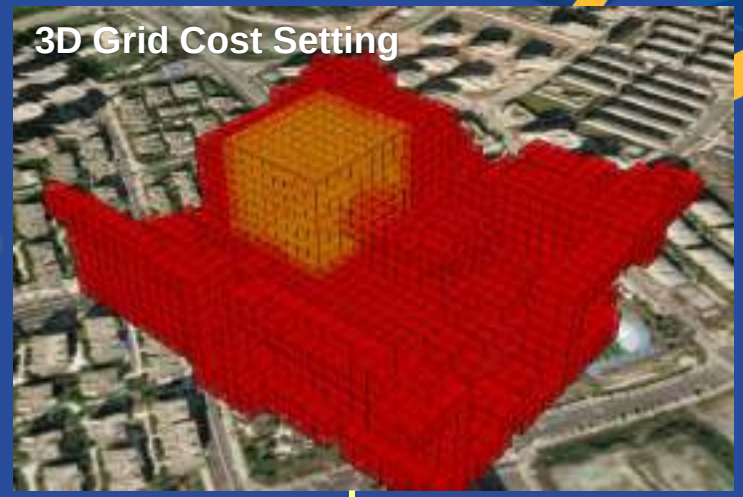
Civil Aviation Department
The Government of the Hong Kong Special Administrative Region

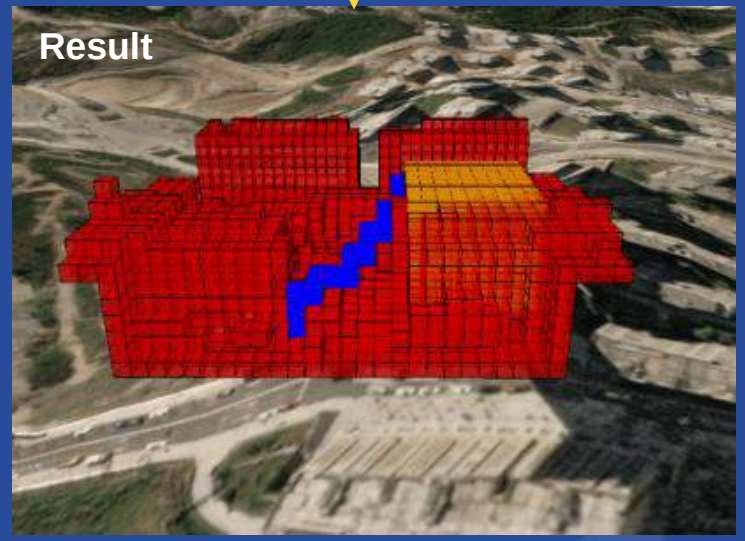
Methodology









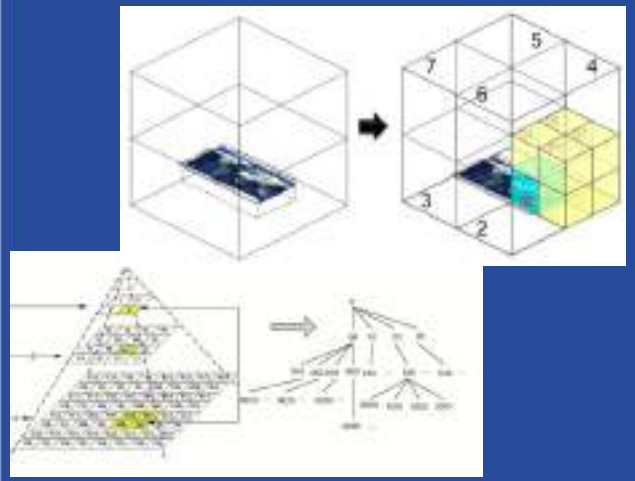


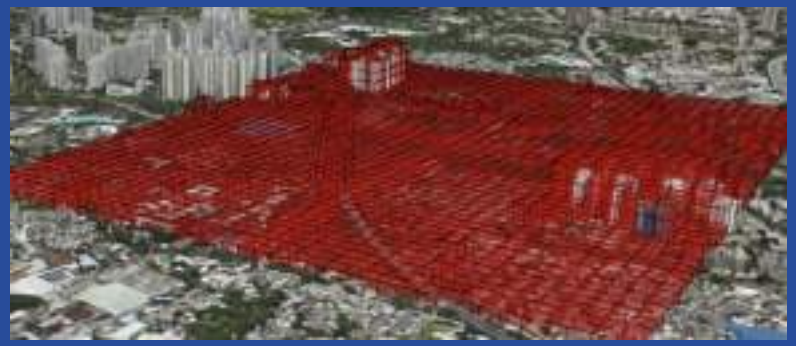
3D Grid Generation

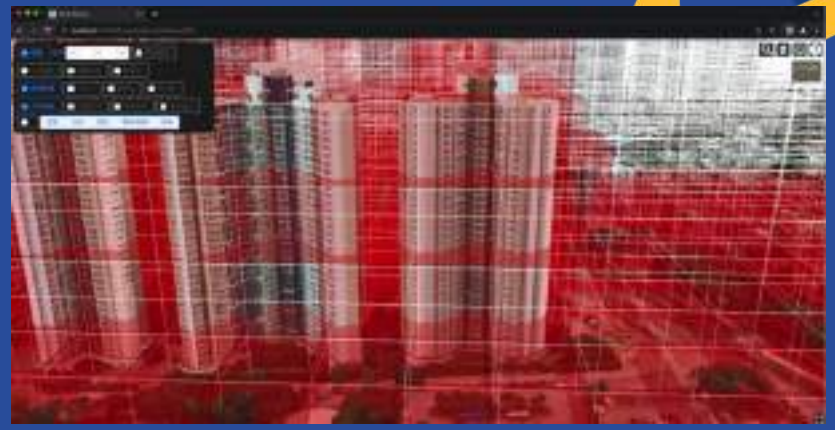
3D Grid Path Planning

3D Grid Generation

Generating 0-32 levels 3D Grid according to GeoSOT → Incorporating 3D Visualisation Map (Level 19) → Generating Boundary Grid (Level 19-21)







Level	Scale	Level	Scale	Level	Scale
0	Global	11	29.6 km	22	15.5 m
1	1/4 Global	12	14.8 km	23	7.7 m
2	-	13	7.4 km	24	3.9 m
3	-	14	3.7 km	25	1.9 m
4	-	15	1.8 km	26	1.0 m
5	-	16	989.5 m	27	0.5 m
6	890.5 km	17	494.7 m	28	24.2 cm
7	445.3 km	18	247.4 m	29	12.0 cm
8	222.6 km	19	123.7 m	30	6.0 cm
9	111.3 km	20	61.8 m	31	3.0 cm
10	59.2 km	21	30.9 m	32	1.5 cm

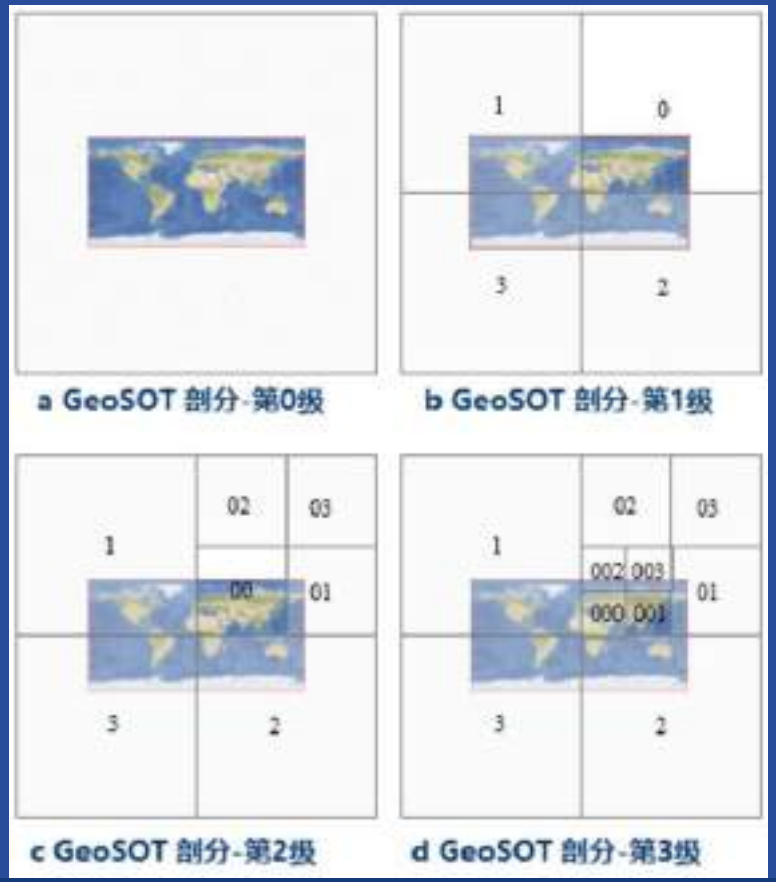
3D Grid Coding

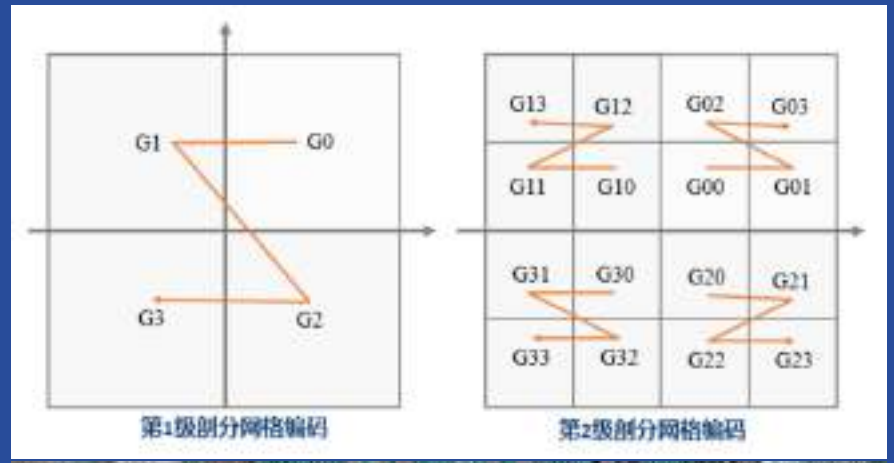
GeoSOT Grid: “Gddddddddd-mmmmmm-ssssss.uuuuuuuuuu” coding as “G+degree+minute+second”
*d, *m, *s, *u each take values 0,1, 2, or 3

The subdivision grid closest to the intersection of the Equator and Prime Meridian is encoded as 0, and the farthest as 3. The remaining two grids are assigned 1 and 2 following the order: first along the latitudinal direction, then along the longitudinal direction.

For altitude encoding:

- Above ground level begins with 0
- Below ground level begins with 1
- The digit length corresponds to the smallest subdivision level, supporting up to 32 levels of precision.





3D Grid Cost Setting

Assigning Z value from DTM to the corresponding Road Centreline / iB1000 (Park, School, Garden, Railway) / Restricted Flying Zone

《小型無人機安全規定》

Safety Distance Buffer Analysis on Heights

Overlay Analysis with 3D Grid

Overlapped Global Grid as Cost Grid

High-cost Grid

Low-cost Grid

Road Centreline

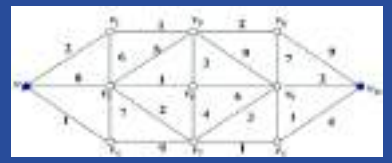
Restricted Flying Zone

3D Grid Path Planning

Setting Start Point & End Point

Seach 3D Indoor Map (roof, platform, balcony) for Take off / Landing

Invoking 3D Grid Generation & Cost Setting

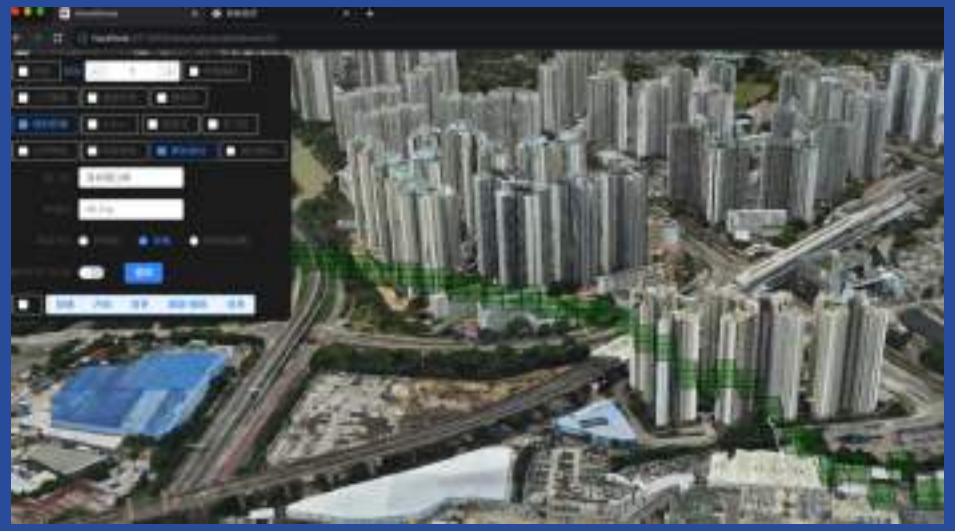


Dijkstra Algorithm

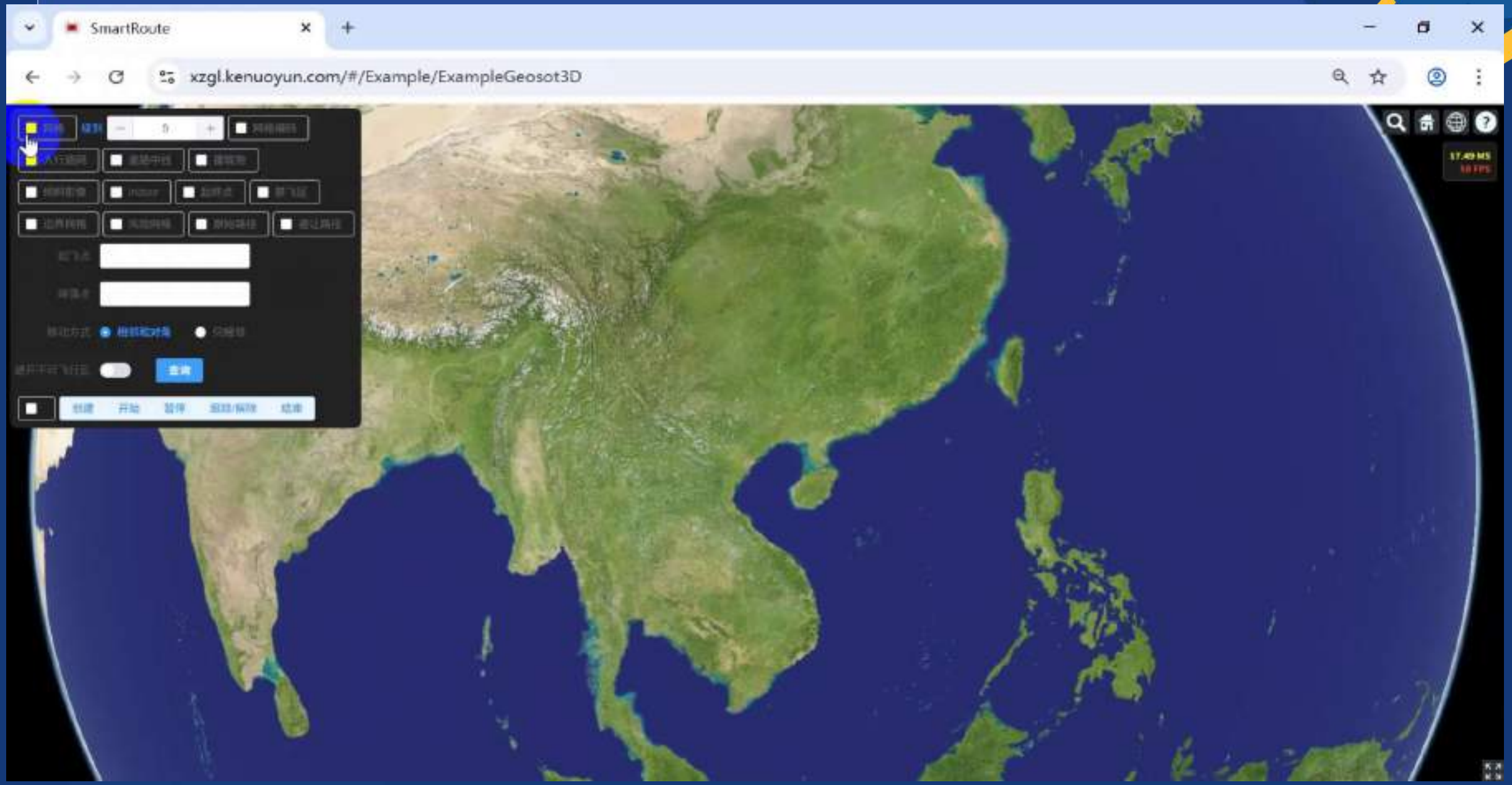
A* Algorithm

Generating Route

Choosing Optimal Route



Case Demo



Expected Benefits

Enhance Delivery Efficiency

01

By rationally planning the low-altitude logistics network and optimizing flight routes, faster and more efficient delivery services can be achieved.

Expand Delivery Coverage

02

Optimizing the cross-border supply chain, and addressing the challenge of the “last-mile” delivery.

Optimize Airspace Resource Allocation

03

The refined management and efficient utilization of low-altitude airspace, which helps to avoid airspace congestion and resource waste, contributes to the coordinated development of various low-altitude industries.

Improve Emergency Rescue Capabilities

04

The optimal low-altitude rescue routes are swiftly planned, and medical supplies as well as emergency rescue equipment can be delivered to the accident site or remote areas in a timely manner.

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Thanks!

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