Satellite Imagery for Urban Population Estimates Training Course

Professional Development Training Course Outline

Category	Demography and Population Studies	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Urban population estimation has become increasingly critical for planning, resource allocation, and policy development in fast-growing cities. The integration of satellite imagery with advanced data analytics allows demographers, urban planners, and policymakers to obtain accurate and timely population data. Satellite Imagery for Urban Population Estimates Training Course equips participants with the knowledge and practical skills to leverage remote sensing, GIS, and machine learning techniques to derive population estimates and monitor urban growth patterns effectively. Participants will gain insights into data acquisition, image processing, population modeling, and the interpretation of satellite-derived metrics to enhance urban population research.

The course emphasizes a hands-on, data-driven approach to understanding urban dynamics using satellite imagery. Participants will explore a wide array of tools and methodologies, including high-resolution imagery, night-time light data, machine learning for population prediction, and GIS-based spatial analysis. By combining theoretical foundations with real-world case studies, learners will develop practical skills that can be immediately applied in government agencies, NGOs, research institutions, and private sector organizations. This course also highlights how satellite imagery supports evidence-based decision-making, demographic forecasting, and urban planning strategies.

Programme Curriculum

Satellite Imagery for Urban Population Estimates Training Course

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Course Objectives

By the end of this course, participants will be able to:

1. Understand the fundamentals of satellite imagery and remote sensing for urban population estimation.
2. Analyze high-resolution satellite images for population density mapping.
3. Apply GIS tools for urban spatial analysis and population distribution studies.
4. Utilize night-time lights and other proxy indicators to estimate urban population.
5. Implement machine learning algorithms for population prediction.
6. Integrate demographic data with satellite imagery for urban modeling.
7. Conduct temporal analysis to monitor urban growth trends.
8. Evaluate the accuracy and limitations of satellite-derived population estimates.
9. Develop actionable insights for urban planning and resource allocation.
10. Interpret spatial patterns for policy formulation and urban management.
11. Design workflows for automating population estimation using satellite data.
12. Assess case studies from global cities for benchmarking population estimates.
13. Communicate findings effectively to stakeholders using visualization and reporting tools.

Organizational Benefits

1. Improved urban planning and infrastructure development.
2. Data-driven decision-making for city management.
3. Accurate population forecasts for resource allocation.
4. Enhanced monitoring of urban growth and migration patterns.
5. Reduced reliance on costly and time-consuming census operations.

6. Improved risk assessment for public health and emergency planning.
7. Better understanding of demographic trends and social dynamics.
8. Increased efficiency in population-related research projects.
9. Competitive advantage in urban analytics and consultancy services.
10. Support for sustainable development goals (SDGs) monitoring.

Target Audiences

1. Urban planners and city managers
2. Demographers and population researchers
3. GIS and remote sensing analysts
4. Policy makers and government officials
5. NGO and development agency staff
6. Environmental and disaster management professionals
7. Academics and researchers in urban studies
8. Data scientists and AI specialists working in urban analytics

Course Duration: 5 days

Course Modules

Module 1: Introduction to Satellite Imagery and Remote Sensing

- Fundamentals of remote sensing
- Types of satellite imagery and sensors
- Spectral signatures for urban analysis
- Data acquisition and preprocessing
- Quality assessment and limitations
- Case Study: Remote sensing for urban expansion in Nairobi

Module 2: GIS for Urban Population Mapping

- Introduction to GIS software and tools
- Spatial data integration and layering
- Mapping urban population density
- Analysis of urban land use patterns
- Creating geospatial visualizations

- Case Study: GIS-based population mapping in Lagos

Module 3: Night-Time Lights and Population Estimation

- Night-time satellite imagery applications
- Correlation between lights and population density
- Data normalization and calibration
- Identifying urban cores and expansion areas
- Accuracy assessment techniques
- Case Study: Estimating populations using night-time lights in Mumbai

Module 4: Machine Learning for Population Prediction

- Introduction to ML algorithms for urban analysis
- Supervised and unsupervised learning techniques
- Feature selection from satellite and demographic data
- Training, testing, and validation workflows
- Predictive modeling of population distribution
- Case Study: ML-based urban population forecasting in Manila

Module 5: Temporal Analysis of Urban Growth

- Monitoring urban expansion over time
- Time-series satellite imagery processing
- Detecting land use and land cover changes
- Evaluating urban sprawl impacts
- Visualization of temporal trends
- Case Study: Temporal urban growth monitoring in Cairo

Module 6: Integration of Demographic Data with Satellite Imagery

- Linking census data with spatial datasets
- Population disaggregation techniques
- Urban modeling for policy applications
- Combining socio-economic indicators with imagery
- Addressing data gaps and inconsistencies
- Case Study: Population estimation in informal settlements in Rio de Janeiro

Module 7: Accuracy Assessment and Validation

- Methods for evaluating satellite-derived estimates
- Cross-validation with census and survey data
- Error metrics and spatial accuracy indicators
- Sensitivity analysis for urban population models
- Improving model reliability and reproducibility
- Case Study: Validation of population estimates in Jakarta

Module 8: Visualization, Reporting, and Decision Support

- Geospatial visualization techniques
- Interactive dashboards for stakeholders
- Reporting formats for urban analytics
- Communicating findings to policy makers
- Integrating results into urban planning processes
- Case Study: Decision support system for urban population in Bangkok

Training Methodology

- Lectures with conceptual frameworks and theoretical foundations
- Hands-on exercises using GIS and remote sensing software
- Guided data analysis using real-world satellite datasets
- Group discussions and knowledge-sharing sessions
- Interactive case studies to illustrate practical applications
- Continuous assessment through quizzes, exercises, and projects

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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