SVAMITVA Drone Imagery AI Project
Brief Overview, Skills & 1-Month Team Plan

For 8-Member Team

December 30, 2025

1 Project Summary

Develop a PyTorch-based AI model for feature extraction from SVAMITVA drone orthophotos:

- Building footprints + roof types (RCC, Tiled, Tin, Others)
- Roads, waterbodies
- Points: transformers, tanks, wells

Target: $\geq$95% accuracy (IoU), optimized for efficiency.
Data: 10 villages (train/validate) + 10 (test).
Deliverables: Trained model, docs, report.

2 Key Implementation Tools

- Framework: PyTorch + segmentation-models-pytorch
- Architecture: U-Net (or DeepLabv3+) with transfer learning
- Geospatial: Rasterio, GeoPandas (for GeoTIFFs & vector outputs)
- Annotation: CVAT/LabelStudio
- Training: Google Colab (free GPUs)
- Deployment: FastAPI/Docker basics

3 Skills to Learn (All Team)

- Python basics + PyTorch
- Image segmentation (U-Net, IoU metrics)
- Geospatial data handling (orthophotos)
- Data augmentation & model evaluation

4 Team Roles (8 Members)

- 2 Leads/Full-Stack: Model architecture & training
- 3 CV Specialists: Segmentation focus
- 2 Geospatial Specialists: Data I/O & preprocessing
- 1 Deployment/Docs (overlap with leads)

5 1-Month Learning Plan (Dec 30, 2025 – Jan 27, 2026)

4-6 hours/day, hands-on in Colab.

5.1 Week 1: Foundations (All)

fast.ai Practical Deep Learning for Coders (free, top-down): https://www.youtube.com/playlist?list=PLfYUBJiXbdtSvpQjSnJJ_PmDQB_VyT5iU

5.2 Weeks 2-3: Segmentation (CV Focus)

U-Net in PyTorch from scratch:

- Aladdin Persson (best hands-on): https://www.youtube.com/watch?v=IHq1t7NxS8k
- Another solid tutorial: https://www.youtube.com/watch?v=HS3Q_90hnDg

Practice on public aerial/satellite datasets.

5.3 Weeks 3-4: Geospatial (Geo Focus)

Rasterio & GeoPandas basics:

- Rasterio for Beginners: https://www.youtube.com/watch?v=LVt8CezezZQ
- Intro Rasterio series: Search "giswqs rasterio" on YouTube

5.4 Final Days

Build mini-prototype on sample drone-like images (aim ¿80% IoU).

By Jan 27: Ready to start project prototyping.