AAVA

Authorised Address Validation Agency

Part of DHRUVA Digital Address Ecosystem

Government of India Initiative - Department of Posts

Documentation Version 1.0 - November 30, 2025

1. Overview

AAVA (Authorised Address Validation Agency) is a comprehensive web application. It is part of India's DHRUVA Digital Address Ecosystem - a Government of India initiative by the Department of Posts.

The application provides a unified digital addressing system with address validation, DIGIPIN geocoding, confidence scoring, and AI-powered assistance.

2. Problem Statement

India faces critical addressing challenges:

- 60-80 million households lack formal addresses
- Rural areas have ambiguous landmark-based addresses
- Urban slums/informal settlements excluded from formal systems
- No standardized digital addressing infrastructure
- Delivery failures cost the economy billions annually

3. DHRUVA Ecosystem

DHRUVA = Digital Hyperlocal Unique Reliable Verified Address

A unified national digital addressing system with 4 core pillars:

- DIGIPIN: Digital Postal Index Number - 10-character geocode system
- DARPAN: Digital Address Repository for Precision Addressing Network
- DIVYA: Digital Interface for Verified and Yielded Addresses
- AAVA: Authorised Address Validation Agency - Quality assurance

Ecosystem Participants:
- CM (Central Mapper): Maintains DIGIPIN grid system
- AIP (Address Information Provider): Creates/updates addresses
- AIA (Address Information Agent): Field agents who verify
- AIU (Address Information User): Consumers of address data
- AAVA: Validates address accuracy

3. DHRUVA Ecosystem

DHRUVA = Digital Hyperlocal Unique Reliable Verified Address

4. Technology Stack

- Frontend: Streamlit (Python)
- Backend: Python 3.8+
- Database: SQLite
- Maps: Folium + Streamlit-Folium
- Charts: Plotly Express
- AI Chat: Google Gemini API

Key Dependencies:
- streamlit, pandas, numpy, plotly
- folium, streamlit-folium
- google-generativeai, python-dotenv
- Pillow, python-dateutil

5. Project Structure

Main Files:
- app.py: Main application
- requirements.txt: Dependencies
- .env: API keys

Pages:
- Validation Request, Agent Portal
- Confidence Score, Admin Panel, AI Chat

Utils:
- database.py, digipin.py, confidence_score.py

6. Application Pages

Home (Dashboard): System overview with metrics

Validation Request: Submit address validation requests with DIGIPIN

Agent Portal: Agent authentication, task management, GPS capture

Confidence Score: Calculate and analyze scores (A+ to F grades)

Admin Panel: System administration, audit logs, reports

AI Chat: General-purpose AI assistant with AAVA expertise

6. Application Pages

7. DIGIPIN Technical Specifications

DIGIPIN is a 10-character alphanumeric geocode that pinpoints any location in India to approximately 4m x 4m accuracy.

Character Set (16 chars): 2 3 4 5 6 7 8 9 C F J K L M P T

Geographic Bounds:

- Latitude: 2.5N to 38.5N

- Longitude: 63.5E to 99.5E

Resolution:

- Level 1: ~1000 km

- Level 5: ~4 km

- Level 10: ~4 m (exact spot)

Format:

- Raw: 3PJK4M5L2T

- Display: 3PJ-K4M-5L2T

8. Confidence Score Algorithm

Formula: SCORE = 100 x [(DSR x 0.30) + (SC x 0.30) + (TF x 0.20) + (PVS x 0.20)]

Components:

1. DSR (Delivery Success Rate) - 30%

2. SC (Spatial Consistency) - 30%

3. TF (Temporal Freshness) - 20%

4. PVS (Physical Verification Status) - 20%

Grade Thresholds:

- A+ (90-100): Excellent

- A (80-89): Very Good

- B (70-79): Good

- C (60-69): Fair

- D (50-59): Poor

- F (0-49): Fail

9. Database Schema

7 Core Tables:

1. addresses - DIGIPIN, coordinates, scores

2. validations - Status tracking

3. agents - Performance metrics

4. deliveries - DSR calculation

5. verifications - Evidence records

6. consents - Privacy compliance

7. audit_logs - Hash-chained logs

10. Installation & Setup

Prerequisites: Python 3.8+, pip, Git

Steps:

1. git clone https://github.com/Razz0711/AAVA.git

2. cd AAVA

3. python -m venv venv

4. venv\Scripts\activate (Windows)

5. pip install -r requirements.txt

6. Create .env with GEMINI_API_KEY

7. streamlit run app.py

8. Open http://localhost:8501

11. Deployment

Streamlit Cloud:

1. Push to GitHub

2. Connect at share.streamlit.io

3. Add GEMINI_API_KEY in secrets

4. Deploy

Live URL: https://aava-app.streamlit.app

12. AI Chat Features

Capabilities:

- General Purpose AI (any topic)

- Academic Help (syllabus, homework)

- AAVA Expertise (DIGIPIN, scores)

- Coding Help (any language)

Commands:

- encode 28.6139, 77.2090

- decode 3PJK4M5L2T

- validate 3PJ-K4M-5L2T

- show stats

Features:

- Multiple chat sessions

- 48-hour auto-delete

- Persistent memory

13. Security & Compliance

Security:

- API keys in .env (not in Git)

- Consent-based data access

- Audit logging with hash chains

Compliance: 96.4%

- DIGIPIN Specs: 10/10

- Confidence Score: 12/12

- Validation Workflow: 8/8

- Database Schema: 7/7

- API/UI: 12/12

- Security: 4/6

Thank You

AAVA - Authorised Address Validation Agency

GitHub: https://github.com/Razz0711/AAVA