Behavior-Based Authentication API Documentation

🔗 Base URL

https://behavior-auth-api.onrender.com

GET /

✅ Description:

Check if the API server is live

📥 Output:

```
{ "message": "Behavior Auth API is running" }
```

POST /predict

✅ Description:

Submit a single snapshot to get a behavioral risk score along with contextual risk scores.

📥 Input:

```
{
  "user_id": "s001",

  "tap_data": {
    "tap_duration": 81.0
  },

  "typing_data": {
    "inter_key_delay_avg": 368.20,
    "key_press_duration_avg": 77.70,
    "typing_error_rate": 0.0
  },
```

```json
  "swipe_data": {
    "swipe_speed": 1198.27,
    "swipe_angle": 180.0
  },

  "scroll_data": {
    "scroll_distance": 31.98,
    "scroll_velocity": 499.78
  },

  "sensor_data": {
    "gyro_variance": 0.00821,
    "accelerometer_noise": 0.6357
  },

  "session_metadata": {
    "session_duration_sec": 15,
    "session_start_hour": 9,
    "screen_transition_count": 4,
    "avg_dwell_time_per_screen": 3.75
  },

  "context": {
    "device_info": {
      "os": "Android",
      "os_version": "12",
      "device_model": "Pixel 6"
    },
    "network_info": {
      "network_type": "mobile",
      "ip_address": "192.168.189.170",
      "isp": "Jio"
    },
    "location": {
      "latitude": 19.071242,
      "longitude": 72.885573,
      "timestamp": "2014-03-31T06:20:44.104000"
    }
  }
}
```

📥 Output:

```json
{
  "user_id": "s001",
  "risk_score": 28.49,
  "geo_shift_score": 17.6,
  "network_shift_score": 50.0,
  "device_mismatch_score": 66.67
}
```

📊 Risk Bands:

- **Behavioral Risk (risk_score)**
    - `0–25` : ✅ Normal
    - `26–40` : ⚠️ Slightly Suspicious
    - `41–55` : 🚩 Moderately Suspicious
    - `56–70` : ❗ Anomalous
    - `71–100` : ❌ High-risk anomaly

- **Geolocation Risk (geo_shift_score)**
    - Based on distance/time vs expected max distance (80 km/h):
        - `<20` : Normal
        - `20–40` : Mild shift
        - `41–70` : Suspicious
        - `71–100` : Very unlikely

- **Network Shift Risk (network_shift_score)**
    - `0` → ✅ **Normal**
        - No change in network type, IP subnet, or ISP.
    - `1–30` → 🟡 **Low Risk**
        - Minor change, possibly a switch between WiFi and mobile OR slight IP fluctuation.
    - `31–60` → 🟠 **Medium Risk**
        - Likely IP subnet change or WiFi ↔ Mobile switch. Could indicate user movement.
    - `61–85` → 🔴 **Suspicious**
        - Change in multiple signals (e.g., ISP + subnet, or network type + subnet).
    - `> 85` → 🚩 **Anomalous**
        - All three signals changed — strong sign of network anomaly (new ISP + network type + IP).

POST /end-session

✅ Description:

Submit a full session of multiple snapshots to compute average behavioral risk and contextual score log.

📥 Input:

```
{
  "user_id": "s001",
  "snapshots": [ {...}, {...}, ... ]
}
```

📥 Output:

```
{
  "message": "✅ Session 26 stored for s001",
  "risk_score": 34.15,
  "context_scores": [
    { "geo_shift_score": 10.3, "network_shift_score": 0.0, "device_mismatch_score": 0.0 },
    ...
  ]
}
```

🗃️ Storage:

- Saves session in `data/{user_id}/session_X.csv`
- If risk ≥ 55 → quarantined to `quarantine/{user_id}/`
- Triggers model retraining after 5 sessions

GET /model-meta/{user_id}

✅ Description:

Get metadata about a trained model.

📥 Input:
`user_id` as path parameter

📥 Output:

```
{
  "user_id": "s001",
  "model_exists": true,
  "last_trained": "2025-07-10T18:20:00",
  "snapshot_count": 100,
  "num_sessions": 15,
  "num_quarantined_sessions": 4,
  "model_type": "IsolationForest",
  "model_version": 4
}
```

GET /all-users-meta

✅ Description:

Returns metadata summary for all users.

📥 Output:

```
[
  {
    "user_id": "s001",
    "trained": true,
    "latest_risk": 34.2,
    "last_trained_at": "...",
    "snapshot_count": 100,
    "model_version": 21
  },
  ...
]
```

GET /session-data/{user_id}

✅ Description:

Returns last 10 sessions with full snapshot data and recent risk/context logs.

📥 Output:

```
{
  "user_id": "s001",
  "risk_log": [
    {
      "timestamp": "...",
      "risk": 26.5,
      "geo_shift_score": 21.3,
      "network_shift_score": 50,
      "device_mismatch_score": 0.0
    },
    ...
  ],
  "sessions": [
    {
      "filename": "session_24.csv",
      "snapshots": [ {...}, {...}, ... ]
    },
    ...
```

```
    ]
  }
```

GET /device-profile/{user_id}

✅ Description:

Returns the stored base device profile used for mismatch analysis.

📥 Output:

```
{
  "os": "Android",
  "os_version": "12",
  "device_model": "Pixel 6"
}
```

DELETE /reset-user-data/{user_id}

✅ Description:

Deletes all data (sessions, quarantine, model, risks, device profile, context cache) for user.

📥 Output:

```
{
  "message": "Reset completed for s001",
  "deleted_files": [ ... ]
}
```

⚙️ Units & Expectations

Feature	Unit	Expected Range (Normal User)
tap_duration	milliseconds	50–150
inter_key_delay_avg	milliseconds	200–600

Feature	Unit	Expected Range (Normal User)
key_press_duration_avg	milliseconds	50–150
typing_error_rate	ratio	0.0–0.05
swipe_speed	pixels/seconds	100–10000
swipe_angle	degrees	0–360
scroll_distance	pixels	0–50
scroll_velocity	pixels/seconds	10–500
gyro_variance	variance	~0.01
accelerometer_noise	noise unit	~0.5–1.0
session_start_hour	0–23	Time-based pattern
screen_transition_count	count	2–8
avg_dwell_time_per_screen	seconds	2–5