✅ Your analysis of zugzahlen.csv was successfully executed — here's a concise diagnostic summary based on the log output:

**📊 Zugzahlen Dataset Summary**

* **File path**: data/Swiss/raw/zugzahlen.csv
* **Shape**: 42,204 rows × 22 columns
* **Delimiter**: ;

**🧾 Key Columns**

| **Column** | **Description (inferred)** |
| --- | --- |
| PID\_section | Unique segment ID combining operator & section (e.g. BLS\_LEN\_GN) |
| IM | Infrastructure Manager (e.g. SBB, BLS, DB Netz, SOB...) |
| Line\_designation | Named route (e.g. "Moutier - Lengnau") |
| OP\_From\_Section, OP\_To\_Section | Operational point codes at segment start/end |
| Number\_of\_trains | Count of trains over segment in year |
| Total\_load\_gross\_tonnes | Total weight of transported goods (gross tonnes) |
| Trassenkilometer | Train path kilometers (often missing — only 6,045 non-null values) |
| Geo shape | LineString geometry (almost fully populated — only 194 null) |

**❗ Null/Quality Issues**

| **Column** | **Nulls** | **Comment** |
| --- | --- | --- |
| Trassenkilometer | 36,159 | ⚠️ Mostly missing; limited analytical use |
| Geo shape | 194 | ⚠️ Affects mapping/visualization |
| OPUIC | 194 | ⚠️ Matches Geo shape gap |
| municipalityName | 140 | ⚠️ Minor missing administrative data |

**🧠 Initial Interpretation**

This dataset is **excellent** for:

* Segment-level traffic analytics (train count, weight)
* Regional or infrastructure-operator-based summaries
* Mapping and load intensity visualization (after handling Geo shape nulls)

Would you like a script next to:

1. **Visualize train load and frequency** across Switzerland using Geo shape, or
2. **Join this dataset** with others (e.g. linie\_mit\_polygon.csv or GTFS routes), or
3. **Aggregate by operator, line, or direction**?

Let me know how you'd like to proceed.