MoSD Exam Data Management Plan

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Description: The repository for the "Management of Scientific Data" exam containing information about the creation process of the slides as well as the data and tools used.

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Repository: https://github.com/Smurado/MoSD_Exam

Summary

Datasets:

- **"Data on 14-day notification rate of new COVID-19 cases and deaths" (ECDC):** Weekly national data on cases, deaths, and 14-day rates (ca. 12,600 entries, ~18 MB original).
- **"Data on testing for COVID-19 by week and country" (ECDC):** Weekly testing data including volume and positivity rates (ca. 6,100 entries, ~10 MB original).

Origin: Primary from The European Surveillance System (TESSy) reported by EU/EEA Member States; secondary from public online sources (web-scraped daily by ECDC).

Expected End Size: ~2.5x original after merging/cleaning (ca. 18,700 entries total in processed form).

Data Types:

- Integer (e.g., cases_weekly, tests_done)
- Float (e.g., rate_14_day, testing_rate)
- Strings (e.g., country, year_week)

Data Formats:

- Original: CSV, JSON, XML, XLSX
- Processed: CSV (per country), with metadata in Markdown/PDF

Data Lifecycle

Plan

1. Get an overview of all available material.
2. Analyze the task of the exam.
3. Create a repository to store all metadata for the exam and add project history.
4. Select one of the given scenarios:
    - Chosen: COVID scenario due to its relevance
5. Develop a research question:
    - Selected: "Is there a correlation between cases and testing volume?"
6. Review datasets on the ECDC website:
    - Cases/Deaths Dataset (~12,600 entries)
        - **Pros:** Available in multiple formats, self-explanatory CSV structure, linked GitHub repo.
        - **Cons:** Limited metadata on the website.
    - Testing Volume Dataset (~6,100 entries)
        - **Pros:** Similar to cases/deaths dataset, but with more metadata.
        - **Cons:** Both files saved as `data.csv`, requiring renaming.
7. Select and complete a DMP template:
    - DMP: `doc/ERC-Data-Management-Plan.pdf`
    - Template: Horizon Europe
    - Reason: Chosen for its manageable size.
8. Create slides for the exam:

    - Developed in Microsoft Office (due to time constraints).
    - Available in the repository as `.pptx` and `.pdf`.
9. Document the data lifecycle based on lecture content and Moodle resources.

Collect

- **Source:**
    - Reported by EU/EEA Member States to TESSy.
    - Public online sources compiled by ECDC when TESSy data is unavailable.
- **Auto Collection:**
    - Not needed; data provided by ECDC, web-scraped daily (manual or automated).
- **Purpose:** Collect data to answer the research question.
- **Amount:** Sufficient for analysis.
- **Representativeness:**
    - Biased toward Europe (no non-European countries included).
    - Data quality/noise not fully evaluable.
- **Cost:**
    - ECDC collection costs not transparent.
    - No additional costs for this project (done individually).
- **Storage:** Free GitHub repository (no storage costs).
- **Strategy:** Minimal preprocessing (e.g., selecting time frames, countries).
- **Data Characteristics:**
    - Quantitative, structured, generally trustworthy (ECDC source).

Assure

- **Completeness:**
    - See `src/data_quality.ipynb`.
    - Cases/Deaths: 7.63% NA values in important rows.
    - Testing: 18.86% NA values.
- **Uniqueness:** Ensured by data structure (one entry per week per country).
- **Timeliness:** Fairly representative, though pandemic data may not be 100% accurate.
- **Validity:** All columns valid; NA for missing values.
- **Accuracy:**
    - Weekly data avoids major date format issues.
    - Values are sensible and expected.
- **Consistency:**
    - Generally good.

    - Minor issues:
        - EU vs. country-level entries may cause confusion.
        - Inconsistent country codes (e.g., AUT vs. AT).
        - `year_week` format differs (e.g., with/without leading "W").
- **Multi-Source Issues:** Minor inconsistencies at the instance level; no major flaws.

Describe

- Most metadata sourced from the ECDC website.
- Testing dataset has more metadata than cases/deaths.
- GitHub repo lacks metadata.
- Data is self-explanatory, even for non-medical users.
- More metadata would improve usability.

Preserve

- **Reliability:** ECDC website is reliable, with GitHub backups (no single point of failure).
- **Recommendation:** Upload to a research repository like Zenodo.
- **Publication:** No indication of a published paper; unclear if data is only preserved or published.
- **Quality Features:** Absent on the website.
- **DOI/PID:** Not provided.
- **Authorship:** Only repository participants listed, not dataset authors.
- **Metadata:** Limited for preservation/publishing.
- **Download Options:** Fully supported (CSV, XML, XLSX, JSON).
- **Documentation:** Basic but not comprehensive.
- **Accessibility:** Freely accessible.
- **License:**
    - No explicit license in the repository.
    - ECDC website links to copyright policy (compatible with CC BY 4.0).
    - ECDC must be acknowledged as the original author.
- **Overview:** No column name documentation.
- **Archives:** Available for 20.06.2022 with an R script.
- **Repository:** 42 commits, starting 01.12.2023 (end of record time frame).
- **Indexing:** Well-indexed by Google.

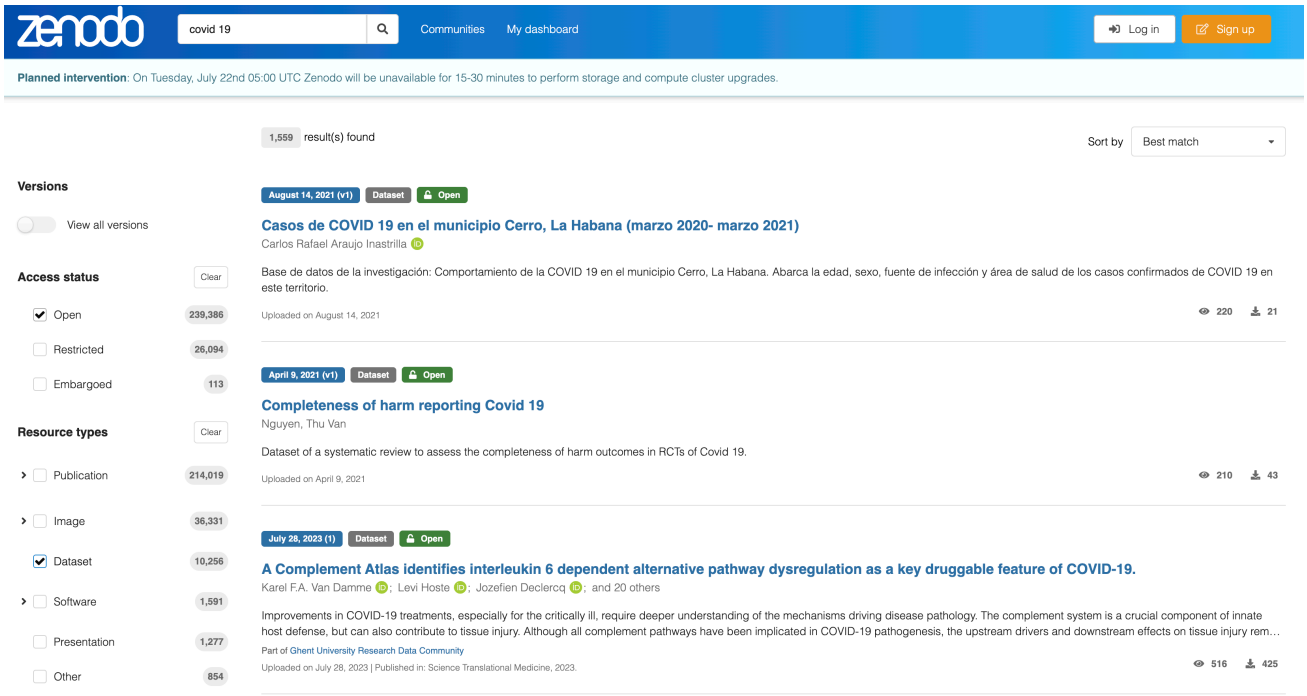
FAIR

Most FAIR criteria are met:

- Data is easy to find (indexed by Google and other search engines).
- Clear structure enables quick use (with data science knowledge).
- Freely accessible without paywalls or login.
- Reusable, though repository lacks some website metadata (e.g., license).
- Reference: FAIR Principles Graphic.

Discover

- **Context:** COVID datasets are common due to the topic's recency.
- **Example:** COVID-19 Vaccines Dataset (7-day period, compatible with ECDC data).
- **Zenodo Search:**
  - COVID-19 Search yields many results.
  - Filtered (open access, CSV, dataset): 1,559 results.
  - Limited regional filtering; no keywords for similar datasets.
  - Likely uses BM25 retrieval; no stemming, special characters removed, stopwords indexed.

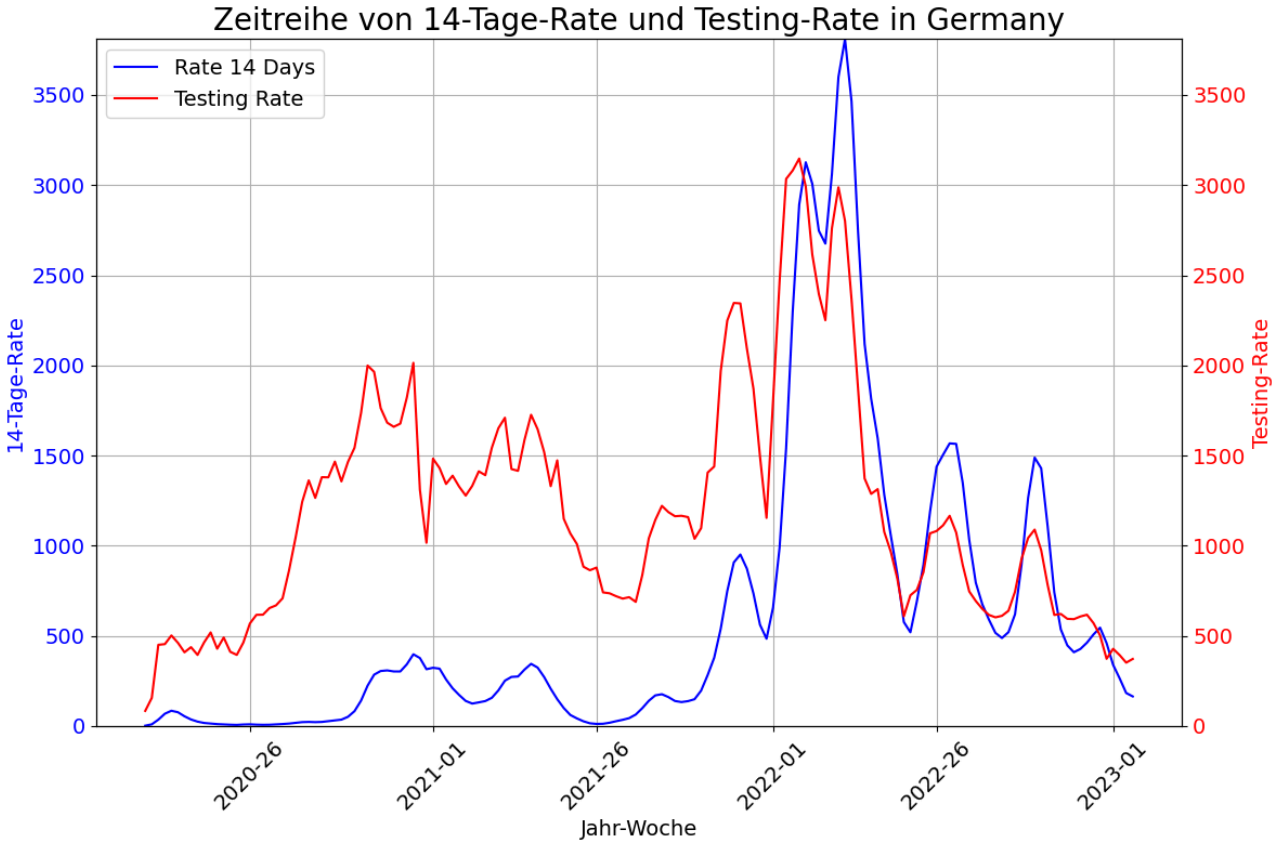


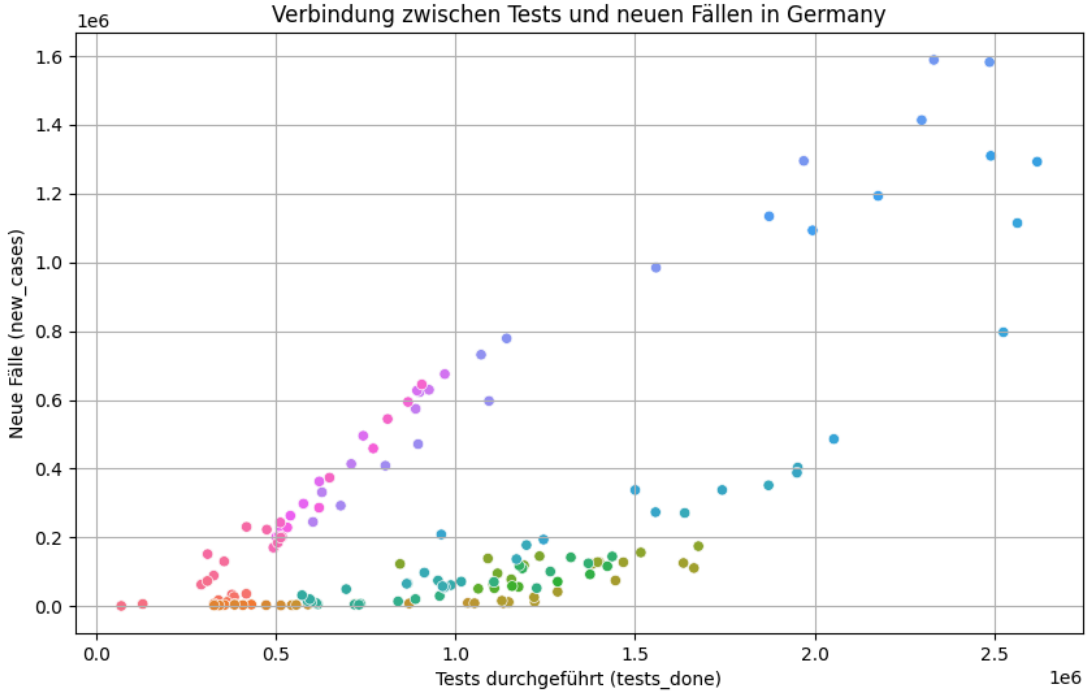
Integrate

- **Goal:** Process datasets to answer the research question.
- **Steps:**
  - Standardize `year_week` format (remove leading "W" in testing dataset).
  - Merge datasets by date.
  - Remove redundant columns and NaN rows.
  - Export per-country datasets to `./data/per_country/` .
- **Implementation:** `data_processing.ipynb` (with AI assistance for faster coding).

Analyze

- **Process:** Analyze one country's dataset, designed for easy replication across countries.
- **Tools:** `data_analysis.ipynb` , `matplotlib` (see Tools section).
- **Findings:** Rising test cases correlate with higher 14-day COVID-19 rates, indicating testing's role in disease management.


Zeitreihe von 14-Tage-Rate und Testing-Rate in Germany
Rate 14 Days
Testing Rate
14-Tage-Rate
Testing-Rate
Jahr-Woche
0
500
1000
1500
2000
2500
3000
3500
2020-26
2021-01
2021-26
2022-01
2022-26
2023-01


Verbindung zwischen Tests und neuen Fällen in Germany
1e6
Neue Fälle (new_cases)
Tests durchgeführt (tests_done)
1e6
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0.0
0.5
1.0
1.5
2.0
2.5

Data Description

Cases/Deaths Dataset

- **country:** String
- **country_code:** String
- **continent:** String
- **population:** Integer
- **indicator:** String (either `cases` or `deaths`)
- **weekly_count:** Integer?
- **year_week:** String (YYYY-WW, e.g., 2020-01)
- **rate_14_day:** Float? (new cases per 100k citizens in 14 days)
- **cumulative_count:** Integer?
- **source:** String
- **note:** String?

Testing Volume Dataset

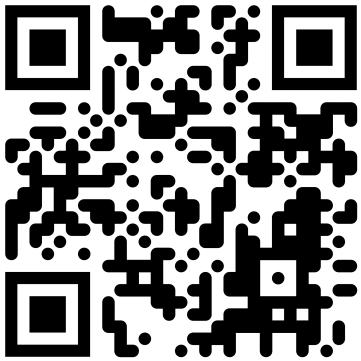
- **country:** String
- **country_code:** String
- **year_week:** String (YYYY-WWW, e.g., 2020-W01)
- **level:** String (always "national")
  ->'region:** String (same as `country_code`)
- **region_name:** String (same as `country`)
- **new_cases:** Integer?
- **tests_done:** Integer?
- **population:** Integer
- **testing_rate:** Float?
- **positivity_rate:** Float?
- **testing_data_source:** String?

Tools

- macOS Sequoia 15.5
- MacBook Pro 14-inch 2024
- Apple M4 Max 40-Core GPU
- 128.0 GiB RAM

- XNU-Kernel 24.5.0
- Git
- VS Code 1.97.0
- PyCharm 2025.1.3.1
- Office 365 for Mac
- Python 3.9.6
- Python venv, pandas 2.3.1, seaborn 0.13.2, matplotlib 3.10.3

Repository



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