MM 226 – Materials Informatics
Assignment 1 Report

Group 18: Duplex Steels and Ferritic Steels
Group Members:

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Overview of Sources Used

Data was collected from a diverse set of credible sources, including peer-reviewed scientific journals, ASM Handbooks, and trusted websites such as **Wikipedia** and **steelnumber.com**. These sources provided validated mechanical and microstructural properties of Duplex and Ferritic Steels under different processing and testing conditions. To optimize the search process and reduce time, tools like **Perplexity AI** were also utilized for quick information retrieval and refinement.

Types of Data Collected

The compiled dataset includes the following categories:

- **Mechanical Properties:** Yield Strength, Ultimate Tensile Strength (UTS), Hardness, Elongation, Test Temperature, and Strain Rate.
- **Microstructural Information:** Grain size, phases present, and methods of phase identification.
- **Composition:** Chemical composition for each alloy entry, recorded in both **weight %** and **atomic %** where available.
- **Metadata:** Processing history, testing conditions, and source references, including DOIs when applicable.

Missing Data and Gaps Identified

Despite best efforts to gather complete data, a few gaps remain:

- **Atomic fraction data** was often missing when only weight percent was reported in the literature.
- When test conditions such as **strain rate** and **test temperature** were not provided, standard assumptions were made (e.g., 0.001 s^{-1} for strain rate).
- **Grain size** and **phase identification methods** were inconsistently reported, particularly in industrial or handbook sources.

Remarks

All data was curated to maintain **unit consistency**, **standardized naming conventions**, and **traceable metadata**. The final dataset includes over **20 unique entries**, compiled in both CSV and JSON formats. The accompanying Python code was successfully implemented to export data into a clean JSON structure with appropriate metadata tags. A python code was also written to convert the **weight fraction** to **atomic fraction**.

Contribution

Bhumika Aggarwal: Collected and compiled all data related to **Ferritic Steels**; wrote and implemented the **Python code**.
Samridhi: Collected and compiled all data related to **Duplex Steels**; refined the dataset and authored this **report**.

Link : mm226_group18
The drive link contains the **.py** file of the Python code implemented to generate the **.json** format and the individual **.csv** files.