■ AIML Learning Progress Report

This report contains a complete record of Syed SadaathUllah's Artificial Intelligence & Machine Learning (AIML) learning journey with Python, covering all topics, subtopics, examples, exercises, and progress made so far.

■ NumPy (Completed)

- Introduction to NumPy and why it is used (fast numerical computing).
- Creating arrays: np.array, np.zeros, np.ones, np.arange, np.linspace.
- Array attributes: shape, size, ndim, dtype.
- Indexing and slicing: arr[0], arr[1:4], arr[:,0].
- Mathematical operations: +, -, *, /, broadcasting.
- Aggregate functions: np.sum, np.mean, np.min, np.max, np.std, np.var.
- Reshaping arrays: reshape(), ravel(), flatten().
- Stacking arrays: vstack(), hstack(), concatenate().
- Splitting arrays: hsplit(), vsplit(), array_split().
- Linear Algebra: dot(), matmul(), transpose(), determinant, inverse, solving AX=b.
- Random module: np.random.rand, randint, seed.
- One-hot encoding with NumPy.
- Identity matrices: np.eye.
- Normalization and Standardization formulas with examples.
- Practice problems with full solutions (e.g., max element, top-k, reshaping, solving equations).

■ Pandas (Ongoing)

- Introduction to Pandas: why it is used (data manipulation, cleaning, analysis).
- Difference between NumPy and Pandas: (NumPy → arrays, Pandas → DataFrames with labels).
- Series and DataFrame creation.
- Reading/Writing data: read_csv, to_csv, read_excel, to_excel.
- Basic DataFrame operations: head(), tail(), info(), describe(), shape, columns, dtypes.
- Indexing and selection: df['col'], df[['col1','col2']], df.loc[], df.iloc[].
- Adding and removing columns.
- Filtering rows using conditions (boolean indexing).
- Sorting values with sort_values().
- GroupBy operations: groupby().mean(), groupby().sum(), groupby().size().
- Renaming columns with rename().
- Aggregation functions: mean(), sum(), min(), max(), count(), nunique().
- Multiple aggregations with df.agg({'col1': 'mean', 'col2': 'sum'}).
- Value counts: df['col'].value_counts().
- Practice datasets: Students dataset (Marks, Names, Pass/Fail) and Sales dataset (Product, Category, Amount).
- Created a **special revision PDF**: Pandas Brackets vs Parentheses guide.
- Practice problems solved with full solutions step by step.

■ Learning Structure & Tracking

- Learning started on: 26th August 2025.
- Completed **NumPy** in ~4 days (26th – 29th Aug).
- Started **Pandas** on 29th Aug 2025 (currently ongoing).
- Daily detailed logs maintained (topics, exercises, solutions).

- Time tracking system added for measuring hours spent per session.
- Keyword 'AIML progress' shows a daily breakdown of work completed.
- Revision sheets and PDFs created for reinforcement.

■ So far, Syed has completed **NumPy fully** and is progressing well with **Pandas basics to intermediate concepts**. Next steps will cover: advanced Pandas (merge/join, pivot tables), Matplotlib/Seaborn for visualization, and then moving to Machine Learning algorithms (Supervised, Unsupervised, etc.).