**Basic Statistics (General Overview of Data)**

* **count**: The total number of valid pixels within a given crop field or plot. Helps determine if there are missing or masked pixels.
* **sum**: The total reflectance or index value (e.g., NDVI) in a given region. Can indicate total vegetation vigor in a plot.
* **mean**: The average reflectance value for a spectral band. Useful for comparing vegetation health across different areas.
* **median**: The middle reflectance value, which is **less affected by outliers** (e.g., shadows, bare soil, or sensor noise).

**Variability and Spread (How Consistent is the Vegetation Health?)**

* **std (Standard Deviation)**: Measures how much pixel values vary from the mean. A high value may indicate mixed land cover (e.g., crops + weeds), crop variability, or uneven growth.
* **variance**: Similar to standard deviation but squared. Large variance suggests significant differences in plant health across the field.
* **cv (Coefficient of Variation)**: Standard deviation divided by the mean. Useful for **comparing variability across different fields or conditions** regardless of absolute reflectance values.

**Extremes and Thresholds (Identifying Best and Worst Areas)**

* **min**: The lowest reflectance value. Could indicate waterlogged areas, shadows, or poor vegetation growth.
* **max**: The highest reflectance value. Could indicate highly vegetative, healthy crops or sunlit soil patches.
* **range**: Difference between max and min values, showing the **contrast** between the healthiest and weakest vegetation in the field.

**Dominance and Diversity (Are Crops Uniform or Mixed?)**

* **minority**: The least common reflectance value. Could indicate rare crop stress patterns, small patches of weeds, or bare soil.
* **majority**: The most frequent reflectance value. Represents the **dominant vegetation health** across the field.
* **variety**: Number of unique values. A high value suggests a **heterogeneous field**, possibly mixed crops, soil variations, or weed infestation.

**Percentiles & Distribution (How Healthy is Most of the Field?)**

* **top\_10**: The reflectance value at the 90th percentile (the top 10% healthiest vegetation). Identifies the **best-performing** regions in the crop field.
* **top\_15**: The 85th percentile, slightly broader than top\_10.
* **top\_20**: The 80th percentile, useful for identifying strong vegetation regions.
* **top\_25 (Q3, 75th Percentile)**: The reflectance value above which the **top 25% of vegetation pixels** are found.
* **top\_35**: The 65th percentile.
* **top\_50 (Median, 50th Percentile)**: The middle value, splitting the dataset into two halves. Represents **typical vegetation health**.

**Lower Percentiles (How Poor is the Weakest Growth?)**

* **q25 (First Quartile, 25th Percentile)**: The reflectance value below which **25% of the lowest vegetation values fall**. Helps identify **weakest crop areas**.
* **iqr (Interquartile Range = Q3 - Q1)**: Measures the spread of the **middle 50% of values**, showing how consistent the crop health is. A **small IQR** means crops are **uniform**, while a **large IQR** suggests **high variability**.

**Shape of Distribution (How Data is Skewed?)**

* **skewness**: Measures **asymmetry** of the reflectance distribution.
  + **Negative skew** → More low values (many stressed plants, unhealthy areas).
  + **Positive skew** → More high values (mostly healthy plants with few stressed areas).
* **kurtosis**: Measures whether the reflectance values have a **sharp peak** (homogeneous crops) or **flat distribution** (diverse field).
  + **High kurtosis** → Most crops have **similar health**.
  + **Low kurtosis** → There are **many variations** in vegetation health.

**How These Help in Crop Analysis**

* **High mean, median, and top\_25 values** → Strong, healthy vegetation.
* **Low min, high std, and large range** → Uneven growth, potential crop stress.
* **High minority and variety** → Field has mixed land cover, possible weed invasion.
* **Skewness & kurtosis** → Help detect field uniformity and anomalies.