When it comes to statistics there are a number of ways to deal with data. Two common measures used to evaluate variability are standard deviation and variance. While both provide insights into data distribution, they have distinct characteristics and applications. This report aims to clarify the differences between standard deviation and variance and explore their respective use cases.

Variance is a statistical measure that quantifies the average squared difference between each data point and the mean of the dataset. To get variance you take the mean of the squared deviations from the mean. Due to this the units when it comes to variance is units squared. Another thing about variance is that it provides a measure of the spread of data, but it is not in the same units as the original data, which can make it less intuitive for interpretation. One big factor of variance is that it is sensitive to outliers due to squaring the differences from the mean, which can magnify the impact of extreme values. The formula for variance is (σ^2) = Σ(xi - μ)^2 / N.  
 Standard deviation is a measure of the dispersion or spread of data points around the mean. It is the the square root of the variance. The standard deviation has the same units as the original data, making it easier to compare to the data itself. This means the distance from the mean is also more average. While standard deviation still deals with outliers, it is not as extreme as variance due to it being closer to the original data. The formula for standard deviation is √Variance (σ^2), meaning you need the variance to obtain the standard deviation in the first place.  
 In summary, both standard deviation and variance are both valid tools when it comes to statistics. They differ in terms of units, interpretation, and sensitivity to outliers. They have their own pros and cons and should be used for their specific needs. For example, standard deviation is often preferred when dealing with real-world data due to its ease of interpretation. While variance finds more use in theoretical and probabilistic calculations. It all depends on the situation.