

# **autorank**

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# Chapter 1

## Introduction

### 1.1 What is autorank

Autorank is a simple Python package with one task: simplify the comparison between (multiple) paired populations. The performance measures on each data set are then the paired samples, the difference in the central tendency (e.g., the mean or median) can be used to rank the different algorithms.

The distribution of the populations must be analyzed with the Shapiro-Wilk test for normality and, depending on the normality with Levene's test or Bartlett's tests for homogeneity of the data. All this is already quite complex. This does not yet account for the adjustment of the significance level in case of repeated tests to achieve the desired family-wise significance. Additionally, not only the tests should be conducted, but good reporting of the results also include confidence intervals, effect sizes, and the decision of whether it is appropriate to report the mean value and standard deviation, or whether the median value and the median absolute deviation is more appropriate.

The goal of Autorank is to simplify the statistical analysis for non-experts. Autorank takes care of all of the above with a single function call. Additional functions allow the generation of appropriate plots, result tables, and even of a complete latex document. All that is required is the data about the populations is in a Pandas dataframe

## 1.2 Practical implementation of autorank

We have benefited this library to compare different countries worldwide in terms of their new *Covid-19* detected cases and will present ten countries with highest volume in last month.

# Chapter 2

## Graphs

### 2.1 autorank Graph

In this section we see the autorank plot

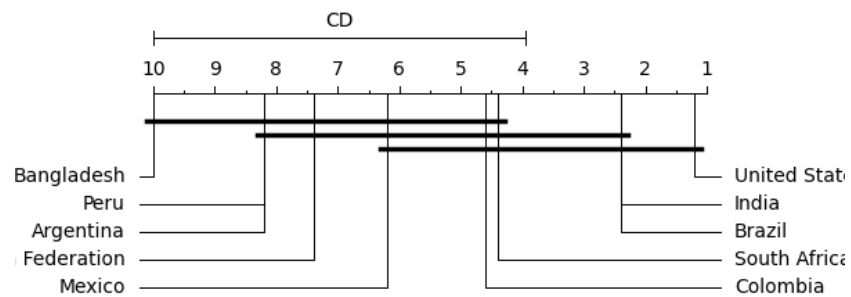


Figure 2.1: autorank plot

### 2.2 matplotlib Garaph

In this section we see the top countries plot

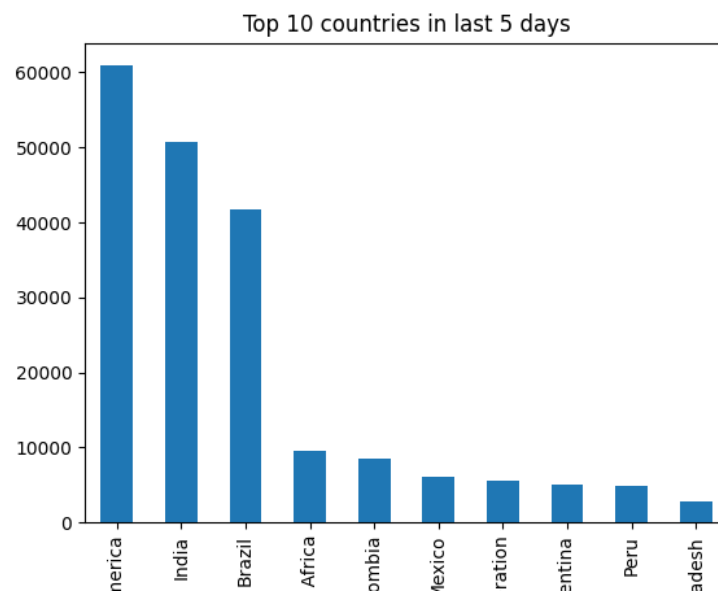


Figure 2.2: Countries with highest rate of new *Covid-19* detected cases

# Chapter 3

## autorank Reports

```

RankResult(rankdf=
              meanrank    mean      std ci_lower ci_upper \
United States of America    1.2  60904.6   4444  49779.9  72029.3
India                      2.4  50669.6  2980.92  43207.4  58131.8
Brazil                     2.4  41779.8   19181 -6236.17  89795.8
South Africa               4.4   9593.8  2221.44  4032.84  15154.8
Colombia                   4.6   8502.8  1118.75  5702.22  11303.4
Mexico                     6.2   6032.8  922.567  3723.33  8342.27
Russian Federation         7.4   5499.2  87.0011  5281.41  5716.99
Argentina                  8.2   5095.2  694.804  3355.89  6834.51
Peru                       8.2   4944.4  652.125  3311.93  6576.87
Bangladesh                 10.0   2742.2  291.552  2012.35  3472.05

              effect_size  magnitude
United States of America      0 negligible
India                      2.70492    large
Brazil                     1.37368    large
South Africa               14.6055    large
Colombia                   16.1713    large
Mexico                     17.0973    large
Russian Federation         17.6283    large
Argentina                  17.5471    large
Peru                       17.6195    large
Bangladesh                 18.4693    large
pvalue=2.243467159937723e-06

```

```
cd=6.058061530516892
omnibus=friedman
posthoc=nemenyi
all_normal=True
pvals_shapiro=[0.6602116823196411, 0.6494571566581726, 0.5465297102928162, 0.02000137
homoscedastic=False
pval_homogeneity=6.142614423781497e-22
homogeneity_test=bartlett
alpha=0.05
alpha_normality=0.005
num_samples=5)
```

## **Abstract**

autorank is a simple Python package with one task: simplify the comparison between (multiple) paired populations. This is, for example, required if the performance different machine learning algorithms or simulations should be compared on multiple data sets. The performance measures on each data set are then the paired samples, the difference in the central tendency (e.g., the mean or median) can be used to rank the different algorithms. In 2.1 you can see one output sample of this library