

## DataFrame is Columnar (Columns are first class citizens)

Index	Var1	Var2	Var3

Observations

Variables

## Creating a DataFrame/Loading Data

```
using namespace hmdf;  
using MyDataFrame = StdDataFrame<...>;  
  
df.load_index(...);  
df.load_column(...);  
df.load_data(...);  
df.read(...);
```

## Getting Data

```
df.get_index();  
df.get_column<...>(...);  
df.get_row<...>(...);
```

## Slicing Data

```
df.get above quantile data<...>(...);  
df.get top n data<...>(...);  
df.get data before times<...>(...);  
df.get data by affin<...>(...);  
df.get data by dbscan<...>(...);  
df.get data by kmeans<...>(...);  
df.get data by like<...>(...);  
df.get data by loc<...>(...);  
df.get data by mshift<...>(...);  
df.get data by rand<...>(...);  
df.get data by sel<...>(...);  
df.get data by spectral<...>(...);  
df.get data by stdev<...>(...);  
df.get top n data<...>(...);  
... more
```

## Reshaping Data

```
df.bucketize<...>(...);  
df.groupby<...>(...);  
df.concat<...>(...);  
df.combine<...>(...);  
df.consolidate<...>(...);  
df.join<...>(...);  
df.sort<...>(...)  
... more
```

## Getting Information About Data

```
df.canon corr<...>(...);  
df.compact svd<...>(...);  
df.covariance matrix<...>(...);  
df.difference<...>(...);  
df.fast ica<...>(...);  
df.load indicators<...>(...);  
df.get col unique values<...>(...);  
df.inversion count<...>(...);  
df.knn<...>(...);  
df.mask<...>(...);  
df.MC station dist<...>(...);  
df.pattern match<...>(...);  
df.pca by eigen<...>(...);  
df.peaks<...>(...);  
... more
```

## Altering Data

```
df.change_freq<...>(...);  
df.detect_and_change<...>(...);  
df.drop_missing<...>(...);  
df.fill_missing<...>(...);  
df.make_stationary<...>(...);  
df.remove_above_quantile_data<...>(...);  
df.remove_bottom_n_data<...>(...);  
df.remove_column<...>(...);  
df.remove_data_by_fft<...>(...);  
df.remove_data_by_iqr<...>(...);  
df.remove_data_by_hampel<...>(...);  
df.remove_data_by_like<...>(...);  
df.remove_data_by_loc<...>(...);  
df.remove_data_by_sel<...>(...);  
df.remove_duplicates<...>(...);  
df.replace<...>(...);  
df.shuffle<...>(...);  
... more
```

## Read/Write Data

```
df.deserialize(...);  
df.from_string(...);  
df.read(...);  
df.serialize<...>(...);  
df.to_string<...>(...);  
df.write<...>(...);
```

## Gears

```
df.apply<...>(...);  
df.set_lock(...);  
df.single_act_visit<...>(...);  
df.visit<...>(...);  
... more
```

## Some of Statistical Analysis done on Columns

MeanVisitor<...> mvisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << mvisitor.get_result();
```

StdVisitor<...> svisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << svisitor.get_result();
```

MedianVisitor<...> mvisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << mvisitor.get_result();
```

ExponentiallyWeightedMeanVisitor<...> ewmvisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << ewmvisitor.get_result();
```

CumMaxVisitor<...> cmvisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << cmvisitor.get_result();
```

QuantileVisitor<...> qvisitor(...);

```
df.single_act_visit<...>(...);  
std::cout << qvisitor.get_result();
```

## Some of Artificial Intelligence Analysis done on Columns

EntropyVisitor<...> evisitor(...);

```
df.single_act_visit<...>(...);
std::cout << evisitor.get_result()[0];
```

FastFourierTransVisitor<...> fftvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << fftvisitor.get_result()[0];
...more
```

PolicyLearningLossVisitor<...> pllvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << pllvisitor.get_result()[0];
```

SigmoidVisitor<...> svisitor(...);

```
df.single_act_visit<...>(...);
std::cout << svisitor.get_result()[0];
```

AnomalyDetectByIQRVisitor<...> iqrvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << iqrvisitor.get_result()[0];
```

SpectralClusteringVisitor<...> scvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << scvisitor.get_result()[0];
... more
```



## Some of Financial Indicators done on Columns

BollingerBand<...> bbvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << bbvisitor.get_upper_band_to_raw()[0];
... more
```

HurstExponentVisitor<...> hevisitor(...);

```
df.single_act_visit<...>(...);
std::cout << hevisitor.get_result();
```

SharpeRatioVisitor<...> srvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << srvisitor.get_result();
```

GarmanKlassVolVisitor<...> gkvvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << gkvvisitor.get_result()[0];
```

VWAPVisitor<...> vwapvisitor(...);

```
df.single_act_visit<...>(...);
std::cout << vwapvisitor.get_result()[0];
```

RSIVisitor<...> rsivisitor(...);

```
df.single_act_visit<...>(...);
std::cout << rsivisitor.get_result()[0];
```

Hello World is Here

Full Documentation with  
Code Samples are Here