# Ball Documentation

*Release 1.0*

**Jin Zhu**

**Oct 18, 2022**

# Contents

Hypothesis tests and sure independence screening (SIS) procedure based on ball statistics, including ball divergence <doi:10.1214/17-AOS1579>, ball covariance <doi:10.1080/01621459.2018.1543600>, and ball correlation <doi:10.1080/01621459.2018.1462709>, are developed to analyze complex data in metric spaces, e.g, shape, directional, compositional and symmetric positive definite matrix data. The ball divergence and ball covariance based distribution-free tests are implemented to detecting distribution difference and association in metric spaces <arXiv:1811.03750>. Furthermore, several generic non-parametric feature selection procedures based on ball correlation, BCor-SIS and all of its variants, are implemented to tackle the challenge in the context of ultra high dimensional data.

Contents:

API List

## 1.1 Ball functions

A complete list of all ball functions provided by Ball.

### 1.1.1 Ball divergence, ball covariance, and ball correlation statistics

These functions compute the estimators for the ball divergence, ball covariance, and ball correlation.

| |
|---|
| `Ball.bd` |
| `Ball.bcov` |
| `Ball.bcor` |

### 1.1.2 Ball Divergence based Equality of Distributions Test

Performs the nonparametric two-sample or K-sample Ball Divergence test for equality of multivariate distributions.

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| `Ball.bd_test` |

### 1.1.3 Ball Covariance based (joint) independence Test

Ball Covariance test of independence. Ball covariance are generic dependence measures in Banach spaces.

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|---|
| `Ball.bcov_test` |

### 1.1.4 Ball Correlation based Sure Independence Screening (BCor-SIS)

Generic non-parametric sure independence screening (SIS) procedure based on Ball Correlation. Ball correlation is a generic measure of dependence in Banach spaces.

```
Ball.bcorsis
```

Ball is developed on Github. Please report issues there as well.

# CHAPTER 2

## Indices and tables

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