A method to compute Gaussian integrals and classification accuracy

# Introduction

## There has been much work on integrating the multinormal in different regions, eg quadratic.

## This has application in classifying normal distributions, using GDA.

## We present an algorithm to integrate up to tri-variate normals in any region. This is important for classifying >2 normals.

## We build open source software to integrate and classify normals, obtain the classification boundaries, compute d' etc, using this and previous integration methods.

## We apply this method in vision research.

## Provide a walkthrough of what’s coming next

# Integrating the multinormal

## in quadratic regions

This is important for optimal classification.

### Standardize the normal and boundary

### Integrate using the generalized chi-square CDF

## in arbitrary regions, up to 3D

### Standardize as before

### Integration over a grid of rays

#### Create a uniform grid of rays (Fibonacci sphere in 3D).

#### Find starting signs and crossing points for each ray in the grid.

#### Compute integral on each ray, then take mean.

# Classification

## Classifying 2 normals

### Equation of the optimal boundary

## Classifying samples

## Classifying >2 normals

## Outcome values

## Approximations and bounds

## Performance benchmark

# Applications

## Examples

## Calen’s project: detection of occluding targets on natural backgrounds

## My project: camouflage detection

### Reducing dimensions