

Granuloma Image Analysis Investigation

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1 Input Data

```
rm(list=ls())
opts_chunk$set(fig.path='./figs/',cache.path='./cache/')
library(mgcv)
library(EBImage)
source("RFuncs.R")

imageList<-system("ls *.png",intern=TRUE)
img1<-readImage("image001.png")

## Warning in .loadFun(files, ...): cannot open the connection
## Error in transpose(y): object is NULL

par(mfrow=c(2,2))
display(img1,method="raster")

## Error in validImageObject(x): object 'img1' not found

display(getFrame(img1,1),method="raster")

## Error in numberOfFrames(y, type): object 'img1' not found

display(getFrame(img1,2),method="raster")

## Error in numberOfFrames(y, type): object 'img1' not found

display(getFrame(img1,3),method="raster")

## Error in numberOfFrames(y, type): object 'img1' not found
```

2 Image Segmentation Data and Plots

```
pdf(file="voronoiSegs.simple.pdf",height=10,width=6.5)
simpleSeg<-sapply(FUN=imageSeg,1:length(imageList),type="simple",simplify=FALSE)

## Error in match.fun(FUN): object 'imageSeg' not found

dev.off()
```

```
## pdf
## 2

pdf(file="voronoiSegs.detailed.pdf",height=10,width=6.5)
detailedSeg<-sapply(FUN=imageSeg,1:length(imageList),type="detailed",simplify=FALSE)

## Error in match.fun(FUN): object 'imageSeg' not found

dev.off()

## pdf
## 2
```

3 Numeric Summaries

```
length(detailedSeg)

## Error in eval(expr, envir, enclos): object 'detailedSeg' not found

names(detailedSeg)<-imageList

## Error in names(detailedSeg) <- imageList: object 'detailedSeg' not found

names(detailedSeg[[1]])

## Error in eval(expr, envir, enclos): object 'detailedSeg' not found

## Rotation Invariant Cell Moment Metrics
f.moment1<-computeFeatures.moment(detailedSeg[[1]]$mask,
                                  ref=detailedSeg[[1]]$image.gy,
                                  properties=FALSE)

## Error in checkx(x): object 'detailedSeg' not found

keep<-computeFeatures.moment(properties=TRUE)$rotation.invariant
f.moment1<-f.moment1[,keep]

## Error in eval(expr, envir, enclos): object 'f.moment1' not found

plot(f.moment1[,1],f.moment1[,2]) ## cell locations

## Error in plot(f.moment1[, 1], f.moment1[, 2]): object 'f.moment1' not found

## Rotation Invariant Basic Cell Location Metrics
f.basic1<-computeFeatures.basic(detailedSeg[[1]]$mask,
                                ref=detailedSeg[[1]]$image.gy,
                                properties=FALSE)

## Error in checkx(x): object 'detailedSeg' not found

keep<-computeFeatures.basic(properties=TRUE)$rotation.invariant
f.basic1<-f.basic1[,keep]

## Error in eval(expr, envir, enclos): object 'f.basic1' not found
```

```

## Rotation Invariant Haralick Features
f.hara1<-computeFeatures.haralick(detailedSeg[[1]]$mask,
                                ref=detailedSeg[[1]]$image.gy,
                                properties=FALSE)

## Error in checkx(x):  object 'detailedSeg' not found

keep<-computeFeatures.haralick(properties=TRUE)$rotation.invariant
f.hara1<-f.hara1[,keep]

## Error in eval(expr, envir, enclos):  object 'f.hara1' not found

## Rotation Invariant Tessalation Moment Features
f.v.moment1<-computeFeatures.moment(detailedSeg[[1]]$vtess,
                                    ref=detailedSeg[[1]]$image.gy,
                                    properties=FALSE)

## Error in checkx(x):  object 'detailedSeg' not found

keep<-computeFeatures.moment(properties=TRUE)$rotation.invariant
f.v.moment1<-f.v.moment1[,keep]

## Error in eval(expr, envir, enclos):  object 'f.v.moment1' not found

## Rotation Invariant Tessalation Shape Features:
f.v.shape1<-computeFeatures.shape(detailedSeg[[1]]$vtess,properties=FALSE)

## Error in checkx(x):  object 'detailedSeg' not found

keep<-computeFeatures.shape(properties=TRUE)$rotation.invariant
f.v.shape1<-f.v.shape1[,keep]

## Error in eval(expr, envir, enclos):  object 'f.v.shape1' not found

```

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5 Wrap Up

```
gc(); save.image() ## Do garbage collection and save workspace.

##          used  (Mb) gc trigger  (Mb) limit (Mb) max used  (Mb)
## Ncells 2440821 130.4   4558878 243.5      NA  4558878 243.5
## Vcells 4819308  36.8   18728330 142.9     16384 25055051 191.2
```