

0	0													
## [9,]	0	0	0	0	0	0	0	222	254	254	254	254	241	198
198	198	198	198	198	198	198	198	170	52	0	0	0	0	0
0	0													
## [10,]	0	0	0	0	0	0	0	67	114	72	114	163	227	254
225	254	254	254	250	229	254	254	254	140	0	0	0	0	0
0	0													
## [11,]	0	0	0	0	0	0	0	0	0	0	0	0	17	66
14	67	67	67	59	21	236	254	106	0	0	0	0	0	0
0	0													
## [12,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	83	253	209	18	0	0	0	0	0	0
0	0													
## [13,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	22	233	255	83	0	0	0	0	0	0	0
0	0													
## [14,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	129	254	238	44	0	0	0	0	0	0	0
0	0													
## [15,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	59	249	254	62	0	0	0	0	0	0	0	0
0	0													
## [16,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	133	254	187	5	0	0	0	0	0	0	0	0
0	0													
## [17,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	9	205	248	58	0	0	0	0	0	0	0	0	0
0	0													
## [18,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	126	254	182	0	0	0	0	0	0	0	0	0	0
0	0													
## [19,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	75	251	240	57	0	0	0	0	0	0	0	0	0	0
0	0													
## [20,]	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	221	254	166	0	0	0	0	0	0	0	0	0	0	0
0	0													
## [21,]	0	0	0	0	0	0	0	0	0	0	0	0	0	3
203	254	219	35	0	0	0	0	0	0	0	0	0	0	0
0	0													
## [22,]	0	0	0	0	0	0	0	0	0	0	0	0	0	38
254	254	77	0	0	0	0	0	0	0	0	0	0	0	0
0	0													
## [23,]	0	0	0	0	0	0	0	0	0	0	0	0	31	224
254	115	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0													
## [24,]	0	0	0	0	0	0	0	0	0	0	0	0	133	254
254	52	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0													
## [25,]	0	0	0	0	0	0	0	0	0	0	0	61	242	254

```

254  52  0  0  0  0  0  0  0  0  0  0  0  0
0  0
## [26,] 0  0  0  0  0  0  0  0  0  0  0  121  254  254
219  40  0  0  0  0  0  0  0  0  0  0  0  0
0  0
## [27,] 0  0  0  0  0  0  0  0  0  0  0  121  254  207
18  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0
## [28,] 0  0  0  0  0  0  0  0  0  0  0  0  0  0
0  0  0  0  0  0  0  0  0  0  0  0  0
0  0

```

```
plot(as.raster(tei[1,,],max=255))
```



```

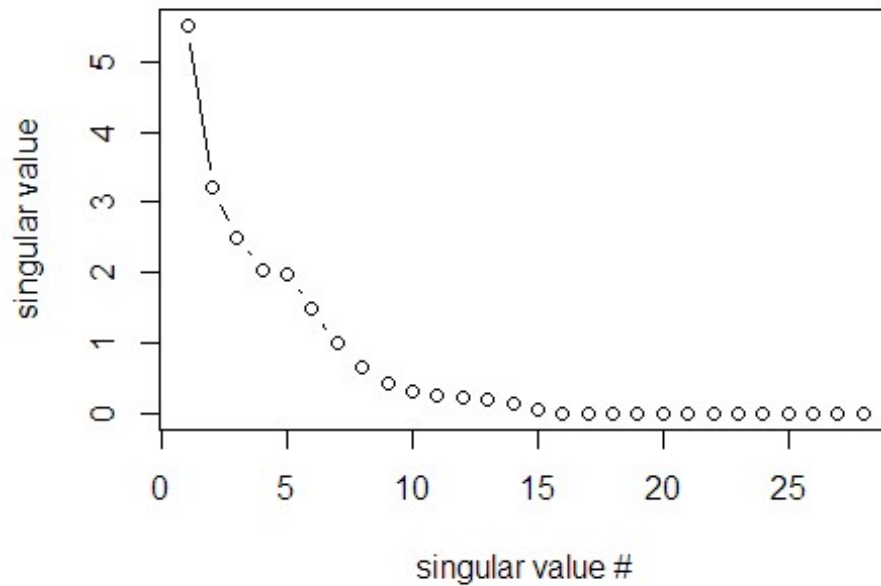
test_labels[1]
## [1] 7
anim = tei[1,,]/255
plot(as.raster(anim,max=1))

```



```
tsvd = svd(anim)
plot(tsvd$d, type = "b", xlab = "singular value #", ylab = "singular value",
main = "singular values from svd decomposition of image matrix",
cex.main=.95)
```

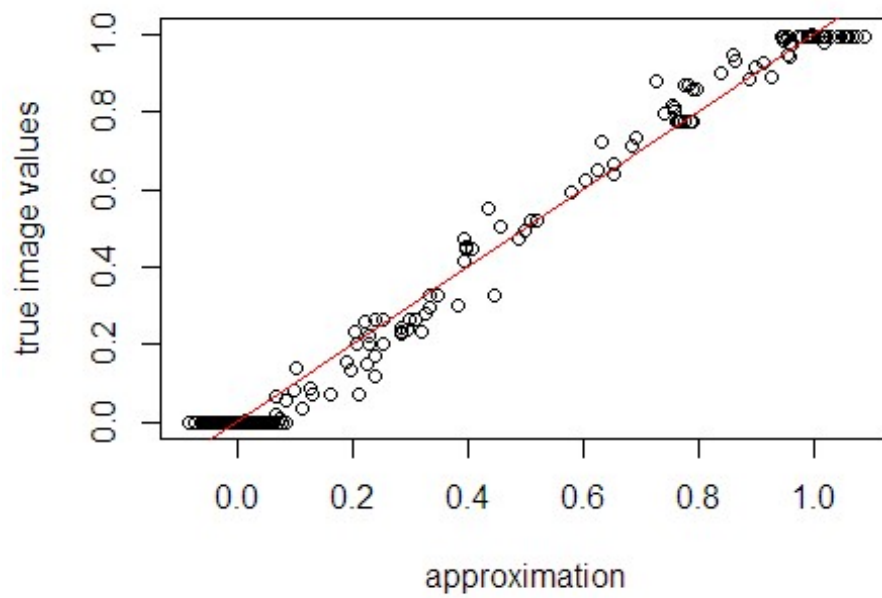
singular values from svd decomposition of image matrix



```
s <- 8 # use approx from first 8
U <- tsvd$u[,1:s]
Sig <- diag(tsvd$d[1:s])
V <- tsvd$v[,1:s]

check <- U %*% Sig %*% t(V)
plot(check, anim, xlab = "approximation", ylab = "true image values", main =
paste("svd approx based on", s, "singular values"), cex.main=1)
abline(0, 1, col = "red")
```

svd approx based on 8 singular values



```
check2 <- check  
check2[check2 < 0] <- 0  
check2[check2 > 1] <- 1  
plot(as.raster(check2,max=1))
```



```
check3 <- check  
check3[check3 < 0] <- 0  
check3[check3 < 0.25] <- 0  
check3[check3 > 1] <- 1  
check3[check3 > 0.75] <- 1  
plot(as.raster(check3, max=1))
```



```
check4 <- check  
check4[check4 < 0] <- 0  
check4[check4 < 0.5] <- 0  
check4[check4 > 1] <- 1  
check4[check4 > 0.5] <- 1  
plot(as.raster(check4,max=1))
```