

1.4.3 競合学習

手書き文字(digit)認識をします。データは下記からダウンロードしてください。

<http://www.kaggle.com/c/digit-recognizer> (<http://www.kaggle.com/c/digit-recognizer>)

```
setwd("C:/Users/k-harada/Desktop/kdd/digit/ORG")  
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 3.1.3
```

```
library(dplyr)
```

```
## Warning: package 'dplyr' was built under R version 3.1.3
```

```
##  
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:data.table':  
##  
##   between, last
```

```
## The following objects are masked from 'package:stats':  
##  
##   filter, lag
```

```
## The following objects are masked from 'package:base':  
##  
##   intersect, setdiff, setequal, union
```

```
traindata <- fread("train.csv")
```

```
##  
Read 23.8% of 42000 rows  
Read 71.4% of 42000 rows  
Read 42000 rows and 785 (of 785) columns from 0.072 GB file in 00:00:05
```

```
testdata <- fread("test.csv")
```

```
##  
Read 71.4% of 28000 rows  
Read 28000 rows and 784 (of 784) columns from 0.048 GB file in 00:00:03
```

```
train_label <- traindata$label[1:28000]
valid_label <- traindata$label[28001:42000]

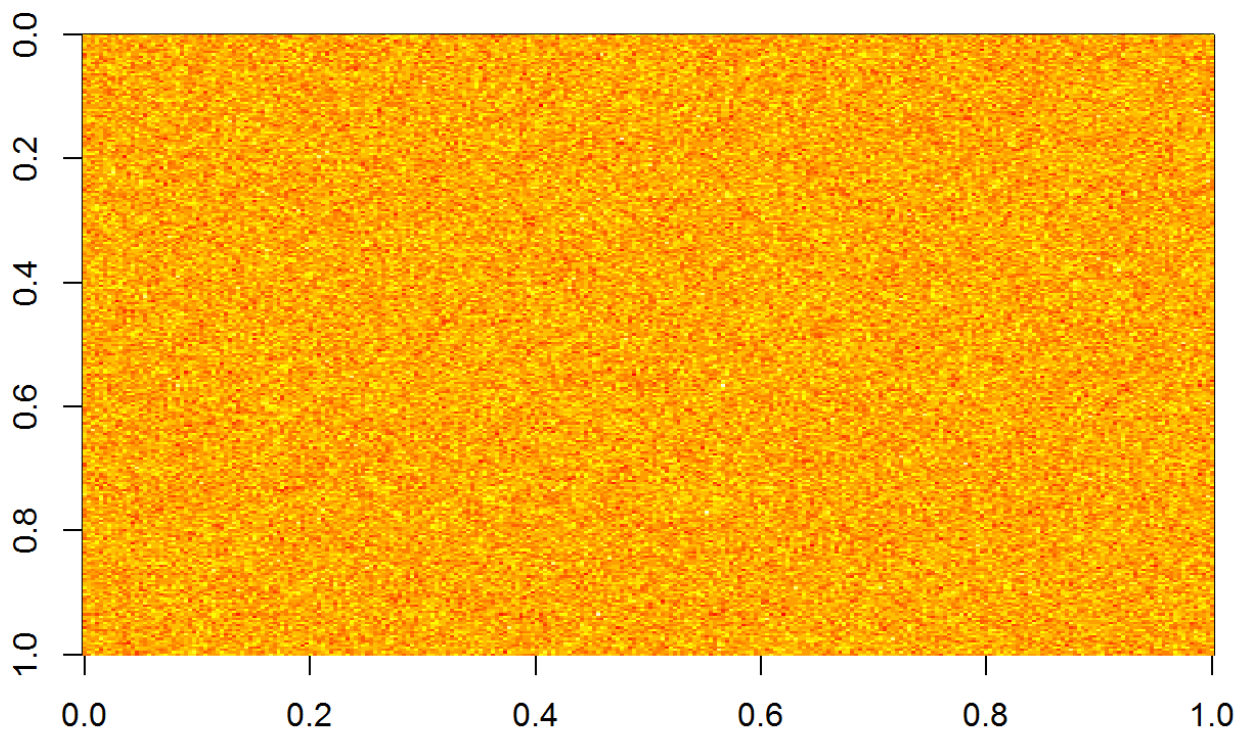
# do not resize here
# /255 so that range in 0-1
train_mat <- as.matrix(traindata[1:28000, ])[, -1]/255
valid_mat <- as.matrix(traindata[28001:42000, ])[, -1]/255
```

簡単な競合学習

出力層を25個として競合学習します

初期値の設定

```
set.seed(0)
W <- matrix(rnorm(100*28*28), nrow=100)
# 規格化
for (i in seq(100)){
  W[i, ] <- W[i, ] / sqrt(sum(W[i, ]*W[i, ]))
}
# 表示
imagemat <- matrix(0, nrow=28*10, ncol=28*10)
for (i in seq(100)){
  imagemat[floor((i-1)/10)*28+1:28, ((i-1)%10)*28+1:28] <- matrix(W[i, ], ncol=28)
}
image(imagemat, ylim=c(1,0))
```



学習(教師なし)

完全ランダムだとうまくいかないので、近隣も学習するようにする (コホネンネットワーク)

```
eta <- 0.01

for (i in seq(28000)) {
  x <- train_mat[i, ]
  # 規格化
  x <- x / sqrt(sum(x*x))
  # 最大出力を見つける
  xtes <- which.max(W %*% x)
  for (j in seq(100)) {
    dj <- (((xtes-1)%10) - ((j-1)%10)) ** 2 + (floor((xtes-1)/10) - floor((j-1)/10)) ** 2
    # UPDATE
    W[j, ] <- W[j, ] + eta*x / (1+dj)
    # 規格化
    W[j, ] <- W[j, ] / sqrt(sum(W[j, ]*W[j, ]))
  }
}

# 表示
imagemat <- matrix(0, nrow=28*10, ncol=28*10)
for (i in seq(100)) {
  imagemat[floor((i-1)/10)*28+1:28, ((i-1)%10)*28+1:28] <- matrix(W[i, ], ncol=28)
}
image(imagemat, ylim=c(1,0))
```

