

## MCMC algorithm for NMF by Moussaoui *et al.* (2006)

### Generating test data

Functions for generating the matrices  $A$  and  $S$  from gamma distributions.

```
generateGammaMatrix <- function(rows, cols, a, b) {  
  M <- matrix(nrow = rows, ncol = cols)  
  for ( i in 1:nrow(M)) {  
    M[i,] <- rgamma(cols, a[i], b[i])  
  }  
  return (M)  
}  
  
generateGammaMatrix(2, 2, rep(1, 2), rep(1e-3,2))  
  
##           [,1]      [,2]  
## [1,]  560.979 232.2606  
## [2,] 1322.767 687.1716
```

A test data set can be generated by sampling matrices  $A$  and  $S$  and adding noise to the resulting matrix  $X$ . The function `generateTestData` makes  $m$  samples from  $n$  sources with  $N$  variables.

```
generateTestData <- function(m, n, N,  
                             alpha=rep(1, N),  
                             beta=rep(1e-3, N),  
                             gamma=rep(1, m),  
                             lambda=rep(1e-3, m),  
                             sigma=rep(0.1, m)) {  
  
  S <- generateGammaMatrix(rows = n, cols = N,  
                           alpha, beta)  
  Atrans <- generateGammaMatrix(rows = n, cols = m,  
                                gamma, lambda)  
  A <- t(Atrans)  
  
  X <- A%*%S  
  
  Xerr <- matrix(nrow = nrow(X), ncol = ncol(X))  
  for(i in 1:nrow(X)) {  
    Xerr[i,] <- X[i, ] + rnorm(ncol(X),  
                               mean=0,  
                               sd=sigma[i])  
  }  
  
  return(list(X=Xerr, A=A,S=S))  
}
```

```

}

testData <- generateTestData(m = 2, n = 2, N = 2)
testData

## $X
##           [,1]      [,2]
## [1,] 1761432.4 5524311.4
## [2,] 154546.7  594119.9
##
## $A
##           [,1]      [,2]
## [1,] 819.2453 1656.979677
## [2,] 158.9498   7.439072
##
## $S
##           [,1]      [,2]
## [1,] 944.4007 3666.591
## [2,] 596.1066 1521.125

```

This shows that the results are consistent with the noise level  $\sigma$ :

```

testData$X - testData$A%%testData$S

##           [,1]      [,2]
## [1,] 0.009582002 0.08748599
## [2,] -0.115016072 -0.03612803

```

## Case 1: Assuming all hyperparameters are known

First we develop methods under the assumption that the noise level  $\sigma$  and the parameters of the gamma distributions are known.

### Sampling $S$

Calculate error of rows of  $S$  from mixing matrix  $A$  and standard deviation of errors,  $\sigma$ , see equation (37), p.4137 in Moussaoui *et al.* (2006)).

```

nmf.sigmaSj <- function(A, sigma=rep(0.1, nrow(A))) {
  sigmaLike <- numeric(length = ncol(A))
  for (j in 1:ncol(A)) {
    sum <- 0
    for (i in 1:nrow(A)) {
      # sum <- sum+ sigma[i]**2/A[i,j]**2
      sum <- sum+ A[i,j]**2/sigma[i]**2
    }
    sigmaLike[j] <- 1/sum
    # sigmaLike[j] <- sum
  }
  return(sqrt(sigmaLike))
}

```

```
sigmaSj <- nmf.sigmaSj(A = testData$A)
sigmaSj
```

```
## [1] 1.198290e-04 6.035016e-05
```

Calculate  $X - AS$  when column  $j$  of  $A$  and row  $j$  of  $S$  are omitted:

```
nmf.epsilonS <- function(X, A, Sold, Snew, j){
  epsilon <- matrix(nrow = nrow(X), ncol = ncol(X))
  for (t in 1:ncol(X)){
    for (i in 1:nrow(X)){
      first.sum<-0
      second.sum<-0
      if( j > 1 ) {
        for (k in 1:(j-1)){
          first.sum <-first.sum + A[i,k]*Snew[k,t]
        }
      }
      if((j+1) <= ncol(A)) {
        for (k in (j+1):(ncol(A))){
          second.sum<-second.sum + A[i,k]*Sold[k,t]
        }
      }
      epsilon[i,t]<- X[i,t] - first.sum - second.sum
    }
  }
  return (epsilon)
}
```

```
nmf.epsilonS(X = testData$X,
             Sold = testData$S, Snew = testData$S,
             A = testData$A, j = 1)
```

```
##           [,1]      [,2]
## [1,] 773695.9 3003838.0
## [2,] 150112.2  582804.1
```

This is the same as omitting source  $j$ :

```
testData$X - testData$A[, -1]%*%t(testData$S[-1,])
```

```
##           [,1]      [,2]
## [1,] 773695.9 3003838.0
## [2,] 150112.2  582804.1
```

```
# testData$X - testData$A[, -2]%*%t(testData$S[-2,])
```

From  $\sigma_{s(j,\cdot)}$  we can calculate  $\mu_{s(j,t)}^{\text{like}}$ . A mistake from Moussaoui \*et al. (2006) must be fixed. The correct formula must be

$$\mu = \sigma_j^{\text{like}} \sum_{i=1}^m \frac{a_{ij} \epsilon_{it}}{\sigma_i^2}$$

```
nmf.muLikelihoodS <- function(X, A, Sold, Snew,
                              sigmaLikelihood,
                              sigma,j) {
  muLike <- numeric(ncol(X))
  epsilon<-nmf.epsilonS(X,A,Sold,Snew,j)

  for (t in 1:ncol(X)) {
    sum <- 0
    for (i in 1:nrow(X)){
      sum<-sum + A[i,j]*epsilon[i,t]/(sigma[i]^2)
      #sum<-sum + A[i,j]*epsilon[i,t]
      # sum<-sum + epsilon[i,t]/A[i,j]
    }
    #muLike[t] <- (1/(sigmaLikelihood[j]^2))*sum
    muLike[t] <- sum*sigmaLikelihood[j]^2
  }
  return(muLike)
}

muLikeS <- nmf.muLikelihoodS(X = testData$X,
                             A = testData$A,
                             Sold = testData$S,
                             Snew = testData$S,
                             sigmaLikelihood =sigmaSj,
                             sigma = rep(0.1,
                                           nrow(testData$S)),
                             j = 1)

muLikeS

## [1] 944.4007 3666.5915
```

A vectorised version of this calculation:

```
eps1 <- nmf.epsilonS(X = testData$X, A = testData$A,
                     Sold = testData$S, Snew=testData$S,
                     j = 1)

muLikeS <- t(eps1/0.1^2)%*%testData$A[,1]
for (j in 1:ncol(muLikeS)) {
  muLikeS[,j] <- muLikeS[,j]*(sigmaSj[j]^2)
}
muLikeS

##           [,1]
## [1,] 944.4007
## [2,] 3666.5915
```

From  $\sigma_{s(j,:)}$  and  $\mu_{s(j,t)}$  the matrix  $S$  can be sampled from the folded normal distribution.

**Note that sampling for the case that  $\alpha \neq 1$  is not implemented, yet!**

```
nmf.sampleS <- function(X, A, Sold,
                        sigma=rep(0.1, nrow(X) ),
                        alpha=rep(1, ncol(X)),
                        beta=rep(1e-3, ncol(X))) {
  Snew <- matrix(0, nrow=nrow(Sold), ncol=ncol(Sold))
  sigmaLikelihood <- nmf.sigmaSj(A, sigma)
  for(j in 1:nrow(Sold)) {
    mulike <- nmf.muLikelihoodS(X, A, Sold, Snew,
                                sigmaLikelihood, sigma,j)
    # mulike <- nmf.muLikelihoodS(X, A, Sold, Sold,
    #                               sigmaLikelihood, sigma,j)

    muPost <- numeric(length = length(mulike))
    muMax <- numeric(length = length(mulike))

    for (t in 1:length(mulike)) {
      muPost[t] <-
        mulike[t] - beta[j]*sigmaLikelihood[j]^2

      Delta <-
        muPost[t]^2 + 4*sigmaLikelihood[j]^2*(alpha[j] - 1)

      if(Delta <=0) {
        muMax[t] <- 0
      }
      else {
        muMax[t] <- 1/2*(muPost[t] + sqrt(Delta))
        if(muMax[t] <= 0) {
          muMax[t]<-0
        }
      }

      # Snew[j,t] <- rfoldnorm(1,muMax[t],
      #                               sigmaLikelihood[j])
      # cat("sIJ=",sigmaLikelihood[j], "muIJ=",mulike[t], "\n")
      Snew[j,t] <- rfoldnorm(1,muMax[t],
                              sigmaLikelihood[j])
    }
  }
  return(Snew)
}

# newS<-testData$S
newS<-matrix(rep(100,4), nrow=2)

for(i in 1:10){
```

```
newS<-nmf.sampleS(X = testData$X,
                  A = testData$A,Sold = newS)
}
newS

##           [,1]      [,2]
## [1,] 1649.2581 5685.6964
## [2,]  247.3139  521.9882
```

Because we have used the “true” solution as the initial condition the result is very similar to the initial condition.

### Sampling $A$

Calculate error of columns of  $A$  from source matrix  $S$  and standard deviation of errors,  $\sigma$ , see equation (45), p.4138 in Moussaoui *et al.* (2006)). The formula contains a mistake it should be

$$\left[\sigma_{a(i,j)}^{\text{likel}}\right]^2 = \frac{\left[\sigma_i^{(r)}\right]^2}{\sum_{t=1}^N \left[s_{jt}^{(r+1)}\right]^2}.$$

(in the article the expressions in the denominator are missing the squares)

As we should according to the Gibbs sampler we use the new matrix  $S$  (saved in the variable newS) rather than the initial condition testData\$S used previously.

```
nmf.sigmaAij <- function(S, sigma = rep(0.1, nrow(S))) {
  sigmaLike <- matrix(nrow = length(sigma),
                     ncol = nrow(S))
  rowSumsS<-rowSums(S^2)

  for (i in 1:nrow(sigmaLike)) {
    for (j in 1:ncol(sigmaLike)) {
      sigmaLike[i,j] <- sigma[i]^2/rowSumsS[j]
    }
  }
  return(sqrt(sigmaLike))
}

sigmaAij <- nmf.sigmaAij(newS #S=testData$S
                        )
sigmaAij

##           [,1]      [,2]
## [1,] 1.68917e-05 0.0001731265
## [2,] 1.68917e-05 0.0001731265
```

Calculate deviation of  $X$  and  $A \cdot S$ , again when omitting source  $j$ .

```

nmf.epsilonA <- function(X, Aold, Anew, S, j){
  epsilon <-matrix(nrow = nrow(X), ncol = ncol(X))
  for (t in 1:ncol(X)){
    for (i in 1:nrow(X)){
      first.sum<-0
      second.sum<-0
      if( j > 1 ) {
        for (k in 1:(j-1)){
          first.sum <-first.sum + Anew[i,k]*S[k,t]
        }
      }
      if((j+1) <= ncol(Aold)) {
        for (k in (j+1):(ncol(Aold))){
          second.sum<-second.sum + Aold[i,k]*S[k,t]
        }
      }
      epsilon[i,t]<- X[i,t] - first.sum - second.sum
    }
  }
  return (epsilon)
}

epsA <-nmf.epsilonA(X = testData$X,
                    Aold = testData$A,
                    Anew = testData$A,
                    S = newS, j = 1)

epsA

##           [,1]      [,2]
## [1,] 1351638.4 4659387.6
## [2,] 152706.9 590236.8

```

Same calculation in vectorised form.

```

testData$X-testData$A[, -1]%*%t(newS[-1,])

##           [,1]      [,2]
## [1,] 1351638.4 4659387.6
## [2,] 152706.9 590236.8

```

Now,  $\mu_{a(i,j)}^{\text{like}}$  can be calculated. As above, Moussaoui *et al.* (2006) needs to be corrected. The true formula is:

$$\mu_{a(i,j)}^{\text{like}} = [\sigma_{a(i,j)}^{\text{likel}}]^2 \sum_{t=1}^N \frac{s_{jt}^{(r+1)} \epsilon_{it}^{(-j)}}{[\sigma_i^{(r)}]^2}.$$

```

nmf.muLikelihoodA <- function(X, Aold, Anew, S,
                              sigmaLikelihood,

```

```

                                sigma, j) {
muLike <- numeric(length = nrow(X))
epsilon<-nmf.epsilonA(X,Aold,Anew,S,j)
for (i in 1:nrow(X)){
  sum <- 0
  for(t in 1:ncol(S)) {
    sum<-sum + S[j,t]*epsilon[i,t]/sigma[i]^2
    # sum<-sum + epsilon[i,t]*S[j,t]^2/sigma[i]^2
    # sum <- sum + S[j,t]*epsilon[i,t]
    # sum <- sum + S[j,t]^2*epsilon[i,t]
    # sum <- sum + S[j,t]/epsilon[i,t]*sigma[i]^2
  }
  # muLike[i] <- (1/sigmaLikelihood[i,j]^2)*sum
# muLike[i] <- sigmaLikelihood[i,j]*sum # close :-)
muLike[i] <- sigmaLikelihood[i,j]^2*sum
  # muLike[i] <-sum
}
return(muLike)
}

nmf.muLikelihoodA(X = testData$X,
                  Aold = testData$A, Anew = testData$A,
                  S = testData$S,
                  sigmaLikelihood = sigmaAij,
                  sigma = rep(0.1,
                              nrow(testData$S)), j = 1)

## [1] 335.1060 65.0172

```

From  $\sigma_{a(.,j)}$  and  $\mu_{a(i,j)}$  the matrix  $S$  can be sampled from the folded normal distribution,  
**Note that sampling for the case that  $\gamma \neq 1$  is not implemented, yet!**

```

nmf.sampleA <- function(X, Aold, S,
                        sigma=rep(0.1, nrow(X)),
                        gamma=rep(1, ncol(X)),
                        lambda=rep(1e-3, ncol(X))) {
Anew <- matrix(0, nrow=nrow(Aold), ncol=ncol(Aold))
sigmaLikelihood <- nmf.sigmaAij(S, sigma)

for(j in 1:ncol(Aold)) {
  mulike <- nmf.muLikelihoodA(X, Aold, Anew, S,
                             sigmaLikelihood,
                             sigma, j)

  muPost <- numeric(length = length(mulike))
  muMax <- numeric(length = length(mulike))

  for (i in 1:length(mulike)) {
    muPost[i] <-
      mulike[i] - gamma[j]*sigmaLikelihood[j]^2

```



```

Delta <-
  muPost[i]^2 + 4*sigmaLikelihood[j]^2*(gamma[j] - 1)

if(Delta < 0) {
  muMax[i] <- 0
}
else {
  muMax[i] <- 1/2*(muPost[i] + sqrt(Delta))
  if(muMax[i] <= 0) {
    muMax[i] <- 0
  }
}

Anew[i,j] <-
  rfoldnorm(1,muMax[i],sigmaLikelihood[i,j])
}
}
return(Anew)
}

newA <- matrix(rep(100,4), nrow = 2)

for( i in 1:100){
newA <- nmf.sampleA(X = testData$X,Aold = newA,
                    S = newS)
}
newA

##           [,1]      [,2]
## [1,]  831.1329 1.539267e+03
## [2,]  103.6565 1.924333e-04

```

Finally, we verify that the product of the new samples for  $S$  and  $A$  remains close to  $X$ :

```

testData$X- newA%%newS

##           [,1]      [,2]
## [1,]   9997.755 -4736.843
## [2,] -16409.702  4760.199

```

### Gibbs sampler for $A$ and $S$

We can now implement a function that samples  $A$  and  $S$  under the assumption that all hyperparameters are known.

```

nmf.nextGibbsAS <- function(X, A, S,
                             sigma=rep(0.1, nrow(X)),
                             alpha=rep(1, ncol(X)),
                             beta=rep(1e-3, ncol(X)),
                             gamma=rep(1, ncol(X)),

```

```

                                lambda=rep(1e-3, ncol(X))) {
nextS <- nmf.sampleS(X,A,S,sigma,alpha, beta)

nextA <- nmf.sampleA(X, A, nextS, sigma, gamma, lambda)

return ( list(S=nextS, A=nextA))
}

nmf.nextGibbsAS(testData$X, testData$A, testData$S)

## $S
##      [,1]      [,2]
## [1,] 944.4008 3666.592
## [2,] 596.1066 1521.125
##
## $A
##      [,1]      [,2]
## [1,] 819.2454 1656.979598
## [2,] 158.9498   7.439213

```

The function `nmfGibbsAS` runs the Gibbs sampler, assuming all hyperparameters are known for `N` iterations.

```

nmfGibbsAS <- function(X, A, S,
                        sigma=rep(0.1, nrow(X)),
                        alpha=rep(1, ncol(X)),
                        beta=rep(1e-3, ncol(X)),
                        gamma=rep(1, ncol(X)),
                        lambda=rep(1e-3, ncol(X)),
                        N=10) {
currSample <- list(S=S, A=A)
out <-list(currSample)

for(i in 2:(N+1)) {
  currSample <- nmf.nextGibbsAS(
    X, currSample$A, currSample$S,
    sigma,
    alpha, beta, gamma, lambda)
  out[[i]] <- currSample
}
return(out)
}

nmfGibbsAS(testData$X, testData$A, testData$S, N=10)

## [[1]]
## [[1]]$S
##      [,1]      [,2]
## [1,] 944.4007 3666.591
## [2,] 596.1066 1521.125

```

```

##
## [[1]]$A
##           [,1]           [,2]
## [1,] 819.2453 1656.979677
## [2,] 158.9498   7.439072
##
##
## [[2]]
## [[2]]$S
##           [,1]           [,2]
## [1,] 944.4005 3666.592
## [2,] 596.1067 1521.125
##
## [[2]]$A
##           [,1]           [,2]
## [1,] 819.2454 1656.979661
## [2,] 158.9498   7.439027
##
##
## [[3]]
## [[3]]$S
##           [,1]           [,2]
## [1,] 944.4004 3666.591
## [2,] 596.1068 1521.125
##
## [[3]]$A
##           [,1]           [,2]
## [1,] 819.2454 1656.979761
## [2,] 158.9498   7.439075
##
##
## [[4]]
## [[4]]$S
##           [,1]           [,2]
## [1,] 944.4001 3666.591
## [2,] 596.1069 1521.125
##
## [[4]]$A
##           [,1]           [,2]
## [1,] 819.2453 1656.979929
## [2,] 158.9498   7.439112
##
##
## [[5]]
## [[5]]$S
##           [,1]           [,2]
## [1,] 944.3999 3666.591
## [2,] 596.1069 1521.125
##
## [[5]]$A

```

```

##          [,1]      [,2]
## [1,] 819.2454 1656.9798
## [2,] 158.9499   7.4391
##
##
## [[6]]
## [[6]]$S
##          [,1]      [,2]
## [1,] 944.400 3666.591
## [2,] 596.107 1521.125
##
## [[6]]$A
##          [,1]      [,2]
## [1,] 819.2454 1656.979725
## [2,] 158.9498   7.438956
##
##
## [[7]]
## [[7]]$S
##          [,1]      [,2]
## [1,] 944.3998 3666.591
## [2,] 596.1070 1521.125
##
## [[7]]$A
##          [,1]      [,2]
## [1,] 819.2454 1656.979663
## [2,] 158.9499   7.438984
##
##
## [[8]]
## [[8]]$S
##          [,1]      [,2]
## [1,] 944.3998 3666.591
## [2,] 596.1070 1521.125
##
## [[8]]$A
##          [,1]      [,2]
## [1,] 819.2454 1656.979669
## [2,] 158.9499   7.439025
##
##
## [[9]]
## [[9]]$S
##          [,1]      [,2]
## [1,] 944.3997 3666.591
## [2,] 596.1070 1521.125
##
## [[9]]$A
##          [,1]      [,2]
## [1,] 819.2455 1656.979594

```

```
## [2,] 158.9499    7.438883
##
##
## [[10]]
## [[10]]$S
##           [,1]      [,2]
## [1,] 944.4000 3666.591
## [2,] 596.1069 1521.125
##
## [[10]]$A
##           [,1]      [,2]
## [1,] 819.2454 1656.979737
## [2,] 158.9499    7.438797
##
##
## [[11]]
## [[11]]$S
##           [,1]      [,2]
## [1,] 944.4002 3666.591
## [2,] 596.1068 1521.125
##
## [[11]]$A
##           [,1]      [,2]
## [1,] 819.2454 1656.979749
## [2,] 158.9499    7.438929
```

We now start with an initial condition far from the true'' values `testData\$S` and `testData\$A` and run the Gibbs sampler for more iterations.

```
testAS<-nmfGibbsAS(testData$X, matrix(rep(1100,4),nrow = 2),
matrix(rep(1000,4),nrow = 2), N=1e6)

lastAS<-testAS[length(testAS)][[1]]

lastAS

## $S
##           [,1]      [,2]
## [1,] 207.9509 1601.789
## [2,] 808.3089 1052.551
##
## $A
##           [,1]      [,2]
## [1,] 2427.2199 1554.7152
## [2,] 295.1718 115.2597
```

The result is *not* similar to `testData\$S` and `testData\$A` (remember that the solution of NMF are usually not unique!). But the resulting product  $A \cdot S$  is close to  $X$  as it should:

```
testData$X - testData$A%*%testData$S
```

```
##           [,1]      [,2]
## [1,]  0.009582002  0.08748599
## [2,] -0.115016072 -0.03612803
```

```
testData$X - lastAS$A%%lastAS$S
```

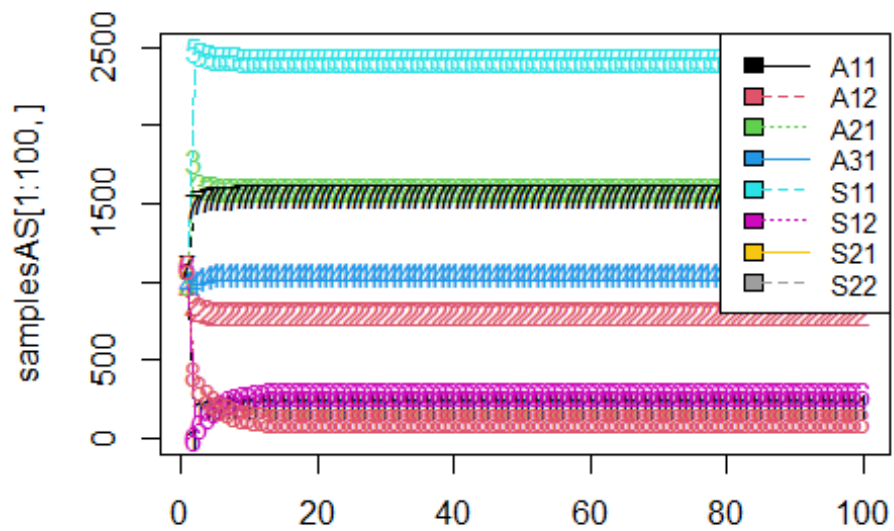
```
##           [,1]      [,2]
## [1,] -0.16246958  0.0303412
## [2,]  0.02297171  0.1534382
```

In order to be able to easily obtain convergence plots, generate histograms etc. we implement a function for converting the list of samples to a data frame:

```
nmfsamplesToMatrix <- function(samples) {
  return (
    # t(
    #   sapply(samples,function(x) sapply(x,as.vector))
    # )
    as.data.frame(t(sapply(samples,unlist)))
  )
}
# samplesS<-t(sapply(testAS,function(x) t(as.vector(x$S))))
# samplesS<-sapply(testAS,function(x) sapply(x,as.vector), simplify = FALSE)
# samplesS<-t(sapply(testAS,function(x) sapply(x,as.vector)))

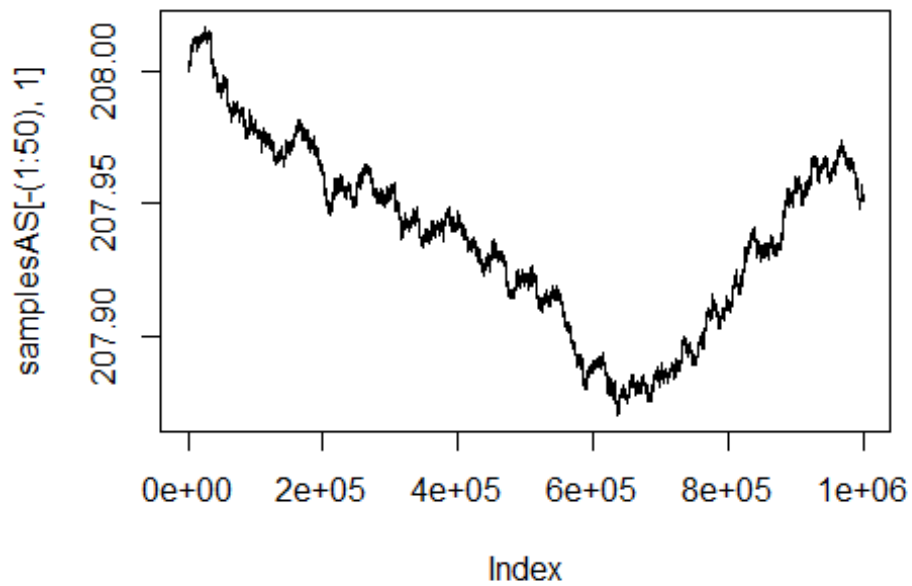
legends <- c("A11","A12","A21","A31","S11","S12","S21","S22")
samplesAS<-nmfsamplesToMatrix(testAS)
# samplesS

matplot(samplesAS[1:100,], type="b")
legend("topright",fill = 1:8, 280, 1, legend=legends,
      col=1:8, lty=1:3, cex=0.8)
```

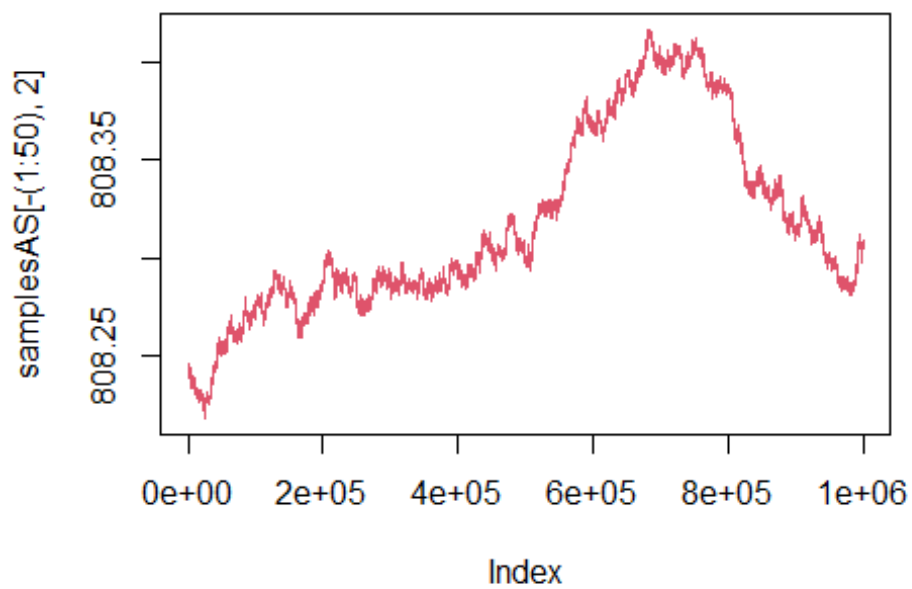


The plot above shows that the Gibbs sampler quickly moves towards a particular solution for the matrices  $A$  and  $S$ . Looking at the convergence plot in more detail, the sampler seems to move very slowly. This shows that the Gibbs sampler is very inefficient.

```
plot(samplesAS[-(1:50),1], type="l")
```

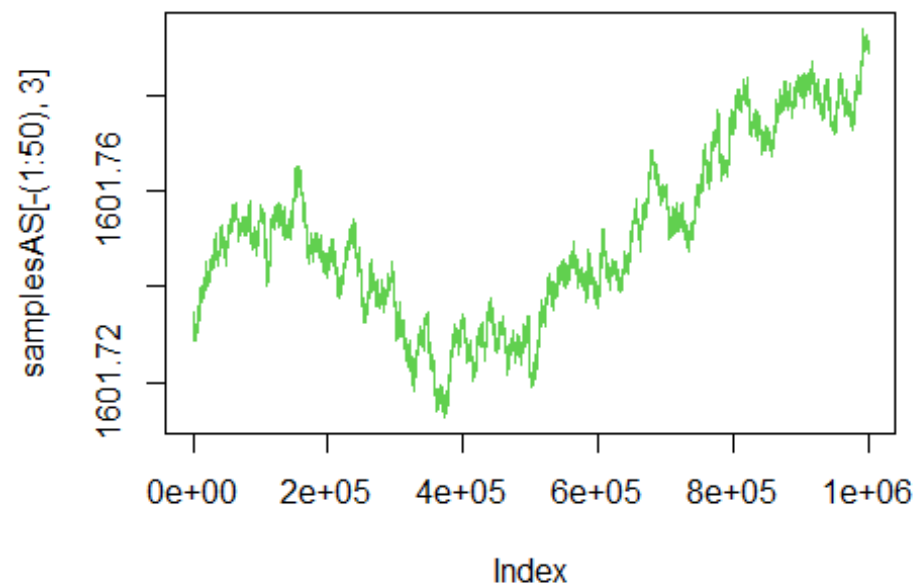


```
plot(samplesAS[-(1:50),2], type="l",col=2)
```

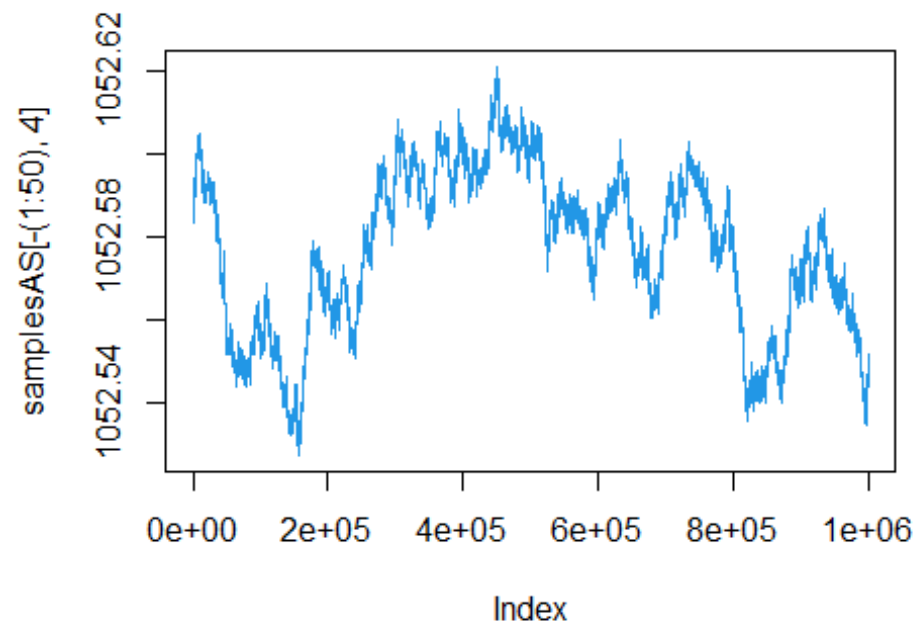


```
plot(samplesAS[-(1:50),3], type="l",col=3)
```

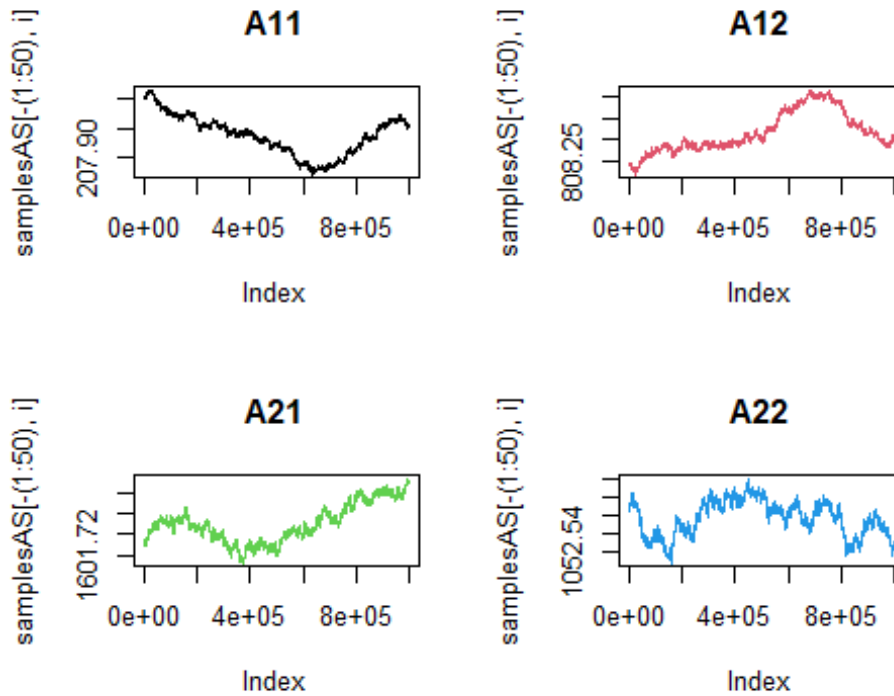




```
plot(samplesAS[-(1:50),4], type="l",col=4)
```

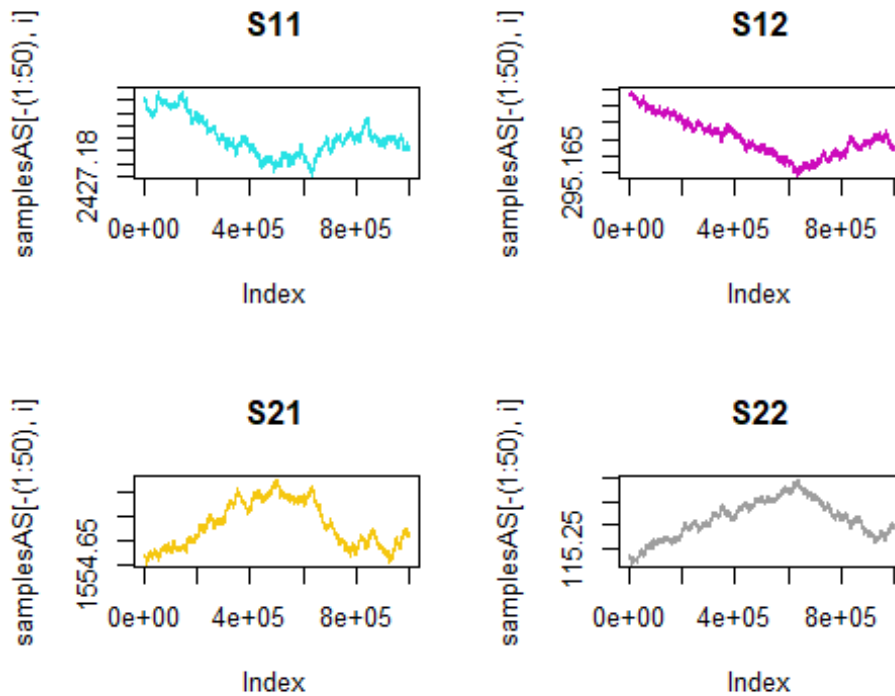


```
leg <- c("A11", "A12", "A21", "A22")
par(mfrow=c(2,2))
for (i in 1:4){
  plot(samplesAS[-(1:50),i], type="l", col=i, main=leg[i])
}
```



**TODO:** Generate more convergence plots!

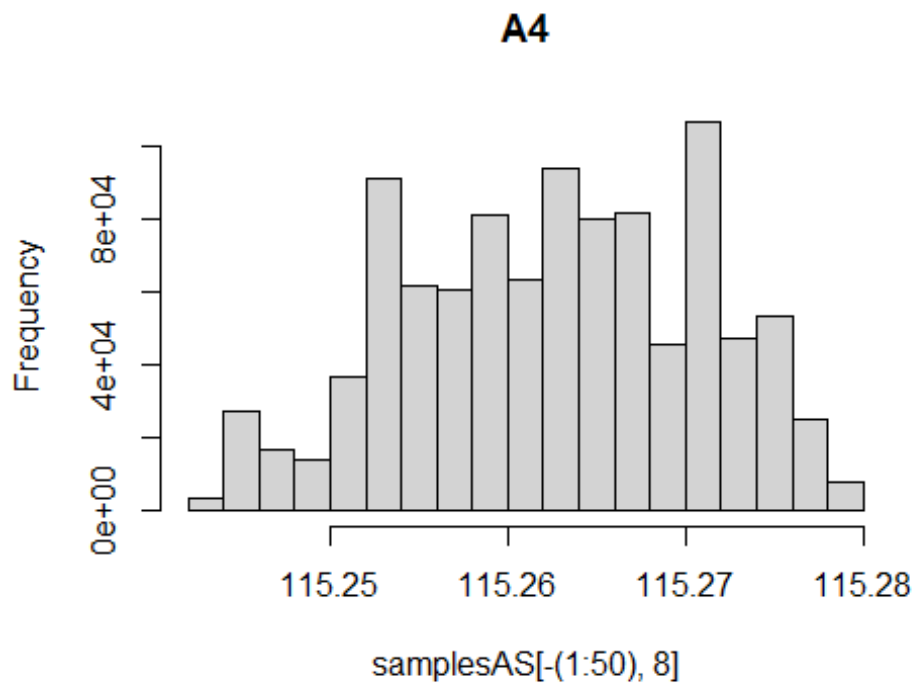
```
leg <- c("S11", "S12", "S21", "S22")
par(mfrow=c(2,2))
for (i in 5:8){
  plot(samplesAS[-(1:50),i], type="l", col=i, main=leg[i-4])
}
```



#README: From the analysis of the convergence plot it seems like a random walk data. Some convergence plot are #monotonously increasing eg: A21 and S12. While some are monotonously decreasing like: S22, A21. But other parameters are #showing random pattern like some times the vaues are increasing and then decreasing.

As an example we generate a histogram for the 8th parameter which happens to be the matrix component  $a_{22}$ .

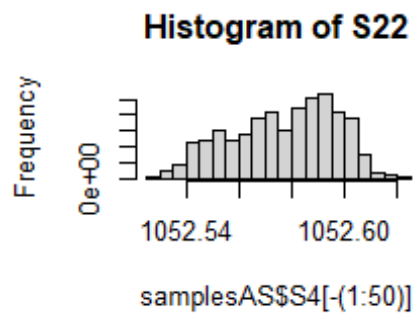
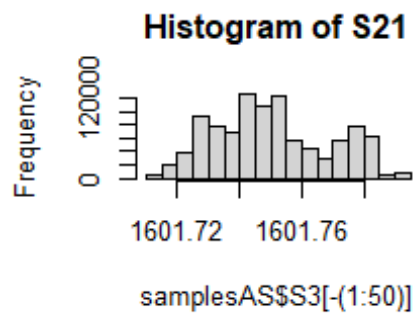
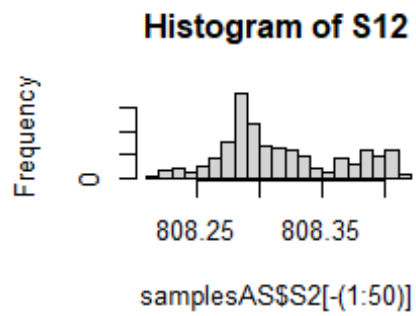
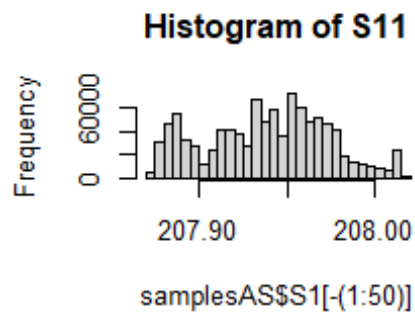
```
hist(samplesAS[-(1:50),8], main = colnames(samplesAS)[8])
```



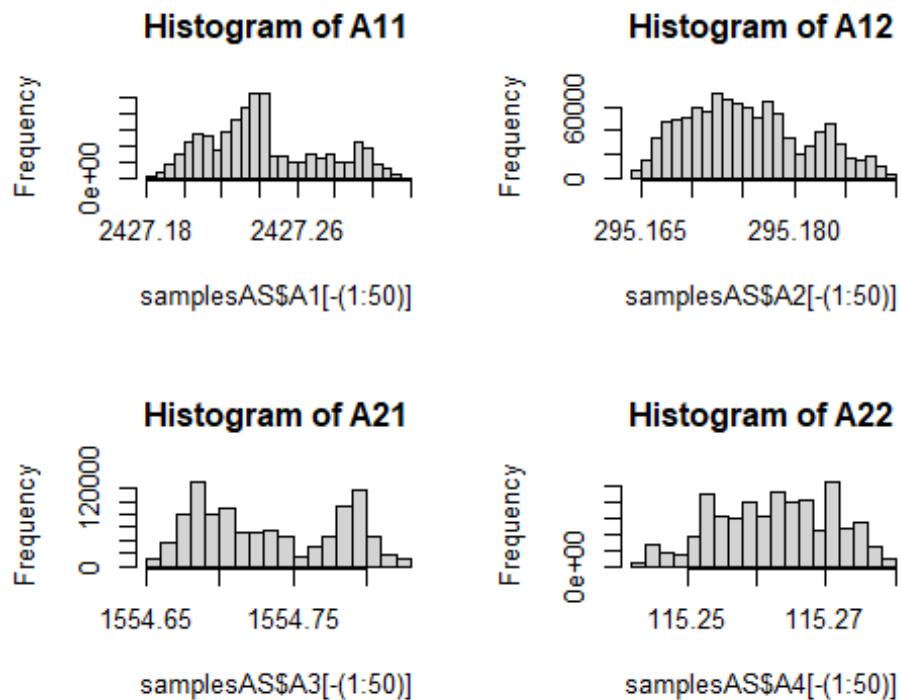
Despite the large number of samples, the shape of the histogram is very irregular. This is likely due to the fact that the Gibbs sampler samples quite inefficiently.

**TODO:** Generate all eight histograms for all components of the matrices  $A$  and  $S$ .

```
#Histogram for S
par(mfrow=c(2,2))
hist(samplesAS$S1[-(1:50)],main="Histogram of S11")
hist(samplesAS$S2[-(1:50)], main="Histogram of S12")
hist(samplesAS$S3[-(1:50)],main="Histogram of S21")
hist(samplesAS$S4[-(1:50)], main="Histogram of S22")
```



```
#Histogram for A
par(mfrow=c(2,2))
hist(samplesAS$A1[-(1:50)], main="Histogram of A11")
hist(samplesAS$A2[-(1:50)], main="Histogram of A12")
hist(samplesAS$A3[-(1:50)], main="Histogram of A21")
hist(samplesAS$A4[-(1:50)], main="Histogram of A22")
```



We now compare with the results we obtain from nmf:

```
NMFresults <- nmf(t(testData$X), 2)
res.A<-coef(NMFresults)
res.S<-basis(NMFresults)
t(res.A)

##           [,1]      [,2]
## [1,] 1.0723383 0.17049203
## [2,] 0.1215728 0.01191115

t(res.S)

##           [,1]      [,2]
## [1,] 674882.7 4461899
## [2,] 6086676.6 4338300

t(res.A)

##           [,1]      [,2]
## [1,] 1.0723383 0.17049203
## [2,] 0.1215728 0.01191115

#testData$X - t(res.S)%*%res.A)
testData$X - t(res.A)%*%t(res.S)
```

```
##      [,1]      [,2]
## [1,]  0 0.000000e+00
## [2,]  0 1.164153e-10

result<- nmf.nextGibbsAS(testData$X, testData$A, testData$S)

result

## $S
##      [,1]      [,2]
## [1,] 944.4007 3666.592
## [2,] 596.1066 1521.125
##
## $A
##      [,1]      [,2]
## [1,] 819.2453 1656.979766
## [2,] 158.9498   7.439104

testData$X-result$A%%result$S

##      [,1]      [,2]
## [1,] -0.04913623 0.01317141
## [2,] -0.07482110 0.11376762
```

The value of A and S sampled from gibbs sampler is totally different from that of the NMF but the product of A and S in both cases are very close to that of test data. Infact the difference of the product of A and S obtained from NMF and test data is 0 while the value is close to 0 for gibbs sampler suggesting that gibbs sampler is less precise or contains some noise.

We now calculate the means of the sampler for parametrising the matrices A and S:

```
samplesASBurnIn<-samplesAS[-(1:50),]
samplesASMeans<- colMeans(samplesASBurnIn)
samplesASMeans

##      S1      S2      S3      S4      A1      A2      A3
A4
## 207.9376 808.3172 1601.7504 1052.5769 2427.2415 295.1753 1554.7333
115.2625
```

We now fill the matrices A and S with these means

```
samplesAS.S <- matrix(samplesASMeans[1:4], nrow = 2, ncol = 2, byrow = FALSE)
samplesAS.S

##      [,1]      [,2]
## [1,] 207.9376 1601.750
## [2,] 808.3172 1052.577

samplesAS.A <- matrix(samplesASMeans[5:8], nrow = 2, ncol = 2, byrow = FALSE)
samplesAS.A
```

```
##           [,1]      [,2]
## [1,] 2427.2415 1554.7333
## [2,] 295.1753  115.2625

testData$X - testData$A%%testData$S

##           [,1]      [,2]
## [1,]  0.009582002  0.08748599
## [2,] -0.115016072 -0.03612803
```

The result is consistent with the noise levels  $\sigma = (\sigma_1, \sigma_2) = (0.1, 0.1)$ .

### Even simpler test data

We now investigate at test data set that should have a unique solution -  $A$  and  $S$  are both diagonal (this is an old example, so only  $S$  is sampled, assuming that  $A$  is already known).

```
simpleS<-diag(c(1,2))
simpleA<-diag(c(2,1))
simpleX <- simpleA%%simpleS
simpleXerr<-simpleX
for(i in 1:nrow(simpleX)) {
  simpleXerr[i,] <- simpleX[i, ] + rnorm(ncol(simpleX),
                                         mean=0,
                                         sd=0.1)
}
simpleXerr[simpleXerr<=0]<-0
simpleTest<-list(X=simpleXerr, S=simpleS, A=simpleA)
simpleTest

## $X
##           [,1]      [,2]
## [1,] 1.804179 0.1128337
## [2,] 0.000000 1.9909413
##
## $S
##           [,1] [,2]
## [1,]      1    0
## [2,]      0    2
##
## $A
##           [,1] [,2]
## [1,]      2    0
## [2,]      0    1
```

The solution is found by the `nmf` function from the NMF package.

```
simpleNMResults <- nmf(t(simpleTest$X), 2)
simpleA<-coef(simpleNMResults)
simpleS<-basis(simpleNMResults)
t(simpleA)
```



```

##           [,1]           [,2]
## [1,] 0.0322919 8.293805e-01
## [2,] 0.9547343 2.220446e-16

t(simpleS)

##           [,1]           [,2]
## [1,] 2.220446e-16 2.08533547
## [2,] 2.175333e+00 0.05485327

simpleTest$X - simpleTest$A%%simpleTest$S

##           [,1]           [,2]
## [1,] -0.1958215 0.112833682
## [2,] 0.0000000 -0.009058734

#t(simpleA)%%t(simpleS)
t(simpleS%%simpleA)

##           [,1]           [,2]
## [1,] 1.804179e+00 0.1128337
## [2,] 6.950145e-16 1.9909413

simpleTest$X

##           [,1]           [,2]
## [1,] 1.804179 0.1128337
## [2,] 0.000000 1.9909413

## simpleTest$X - t(simpleA%%simpleS)
simpleTest$X - t(simpleS%%simpleA)

##           [,1] [,2]
## [1,] 0.000000e+00 0
## [2,] -6.950145e-16 0

N<-2000
samples <- vector(mode = "list", length = N)

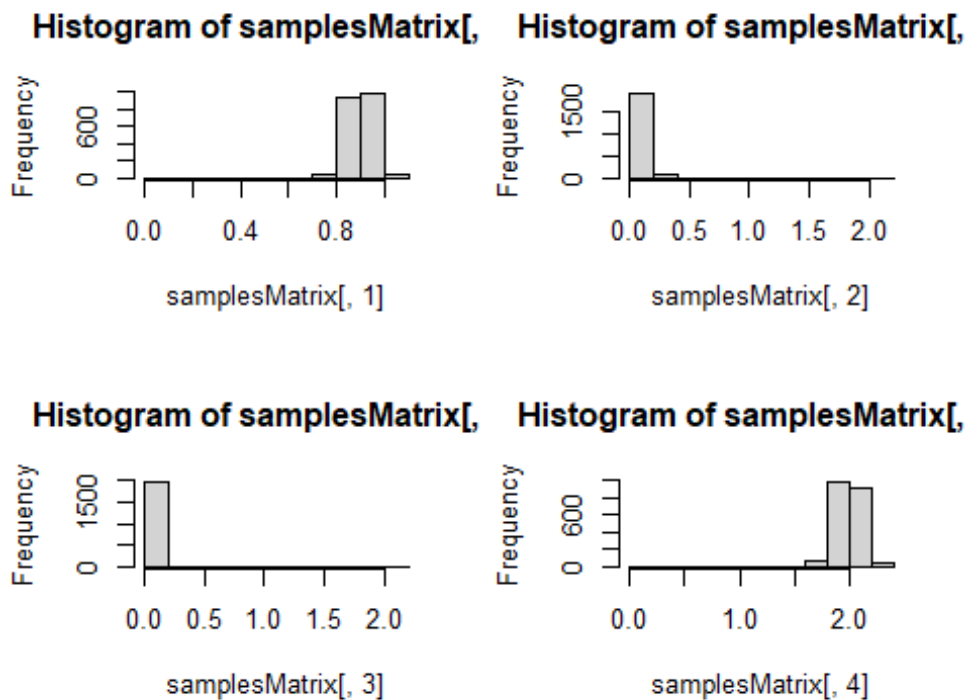
samples[[1]] <- t(simpleS)

for(i in 2:N) {
  samples[[i]]<-nmf.sampleS(simpleTest$X,A = simpleTest$A, Sold = samples[[i-1]],sigma = rep(0.1,2))
}

samplesMatrix <-t(sapply(samples, function(x) t(as.vector(x))))
# t(as.vector(samples[[1]]))
# matplot(samplesMatrix, type="b")
layout(matrix(1:4,nrow = 2,ncol = 2, byrow = TRUE))
hist(samplesMatrix[,1])
hist(samplesMatrix[,2])

```

```
hist(samplesMatrix[,3])
hist(samplesMatrix[,4])
```



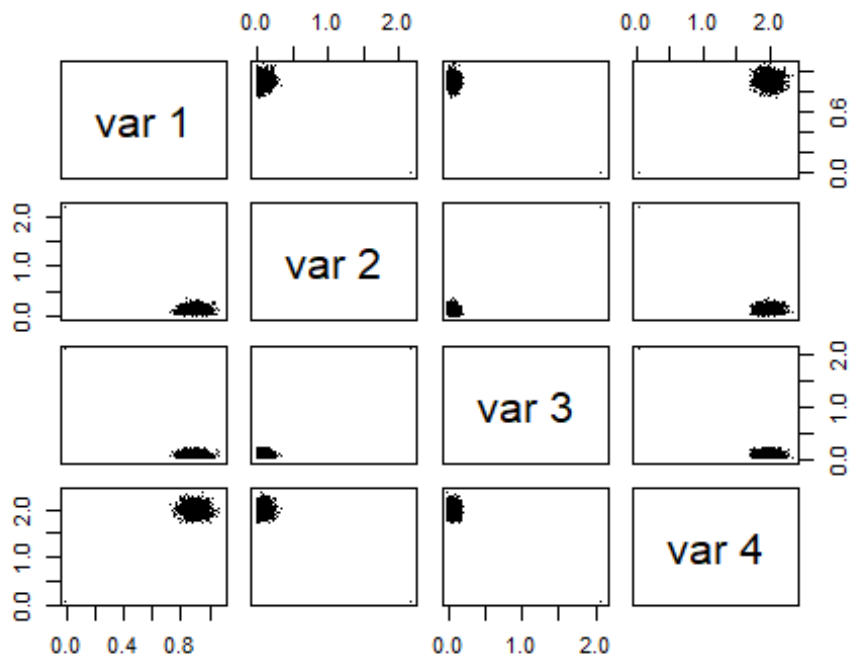
The histograms show that  $S$  is close to

$$S = \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$$

as it should.

We generate matrix plots for identifying possible correlation between parameters:

```
pairs(samplesMatrix, pch=".")
```



Also the column means are close to the expected values:

```
colMeans(samplesMatrix)
```

```
## [1] 0.90043007 0.08142136 0.06358540 1.99248555
```

And the standard deviations are on the order of magnitude of what is expected from the noise added:

```
apply(samplesMatrix, 2, sd)
```

```
## [1] 0.05422442 0.07618146 0.06170167 0.11096567
```

```
testsimpleS<-nmfGibbsAS(simpleTest$X, simpleTest$A, simpleTest$S, N=1000)
```

```
testsimpleS[[100]]
```

```
## $S
```

```
##      [,1]      [,2]
```

```
## [1,] 1.810899 0.08721495
```

```
## [2,] 0.138559 1.77463091
```

```
##
```

```
## $A
```

```
##      [,1]      [,2]
```

```
## [1,] 1.01868816 0.04702907
```

```
## [2,] 0.01173008 1.10654891
```

## Case 2: Sampling the hyperparameter $\sigma_i$ :

This code includes the sampling of the noise variances  $\sigma_i^2$  in addition to the matrices  $A$  and  $S$ .

```
nmf.sampleInverseSigmaSqr <- function(X, A, S, aPrior=1, bPrior=1e-3) {
  invSigma <- numeric(nrow(X))
  aPost <- ncol(X)/2 + aPrior
  residualsSqr <- ((X-A%*%S)^2)
  bPost <- rowSums(residualsSqr)/2 + bPrior
  for (i in 1:nrow(X)) {
    invSigma[i] <- rgamma(1, shape = aPost, rate = bPost[i])
  }
  return(invSigma)
}

nmf.sampleInverseSigmaSqr(testData$X, testData$A, testData$S,
                          aPrior = 1, bPrior = 1e-3)

## [1] 482.5952 436.8712

nmf.nextGibbsASSigma <- function(X, A, S, sigma,
                                alpha=rep(1, ncol(X)),
                                beta=rep(1e-3, ncol(X)),
                                gamma=rep(1, ncol(X)),
                                lambda=rep(1e-3, ncol(X)),
                                sigAlpha=1, sigBeta=1e-3) {
  nextS <- nmf.sampleS(X, A, S, sigma, alpha, beta)

  nextA <- nmf.sampleA(X, A, nextS, sigma, gamma, lambda)

  nextInvSigmaSqr <- nmf.sampleInverseSigmaSqr(X, nextA, nextS,
                                                sigAlpha, sigBeta)

  return ( list(S=nextS, A=nextA, sigma=1/sqrt(nextInvSigmaSqr)))
}

nmf.nextGibbsASSigma(testData$X, testData$A, testData$S, rep(0.1,2))

## $S
##      [,1]      [,2]
## [1,] 944.4006 3666.591
## [2,] 596.1066 1521.125
##
## $A
##      [,1]      [,2]
## [1,] 819.2453 1656.979600
## [2,] 158.9498   7.439074
##
```

```

## $sigma
## [1] 0.09843830 0.06551319

nmfGibbsASSigma <- function(X, A, S, sigma,
                             alpha=rep(1, ncol(X)),
                             beta=rep(1e-3, ncol(X)),
                             gamma=rep(1, ncol(X)),
                             lambda=rep(1e-3, ncol(X)),
                             sigAlpha=1, sigBeta=1e-3,
                             N=10) {
  currSample <- list(S=S, A=A, sigma=sigma)
  out <-list(currSample)

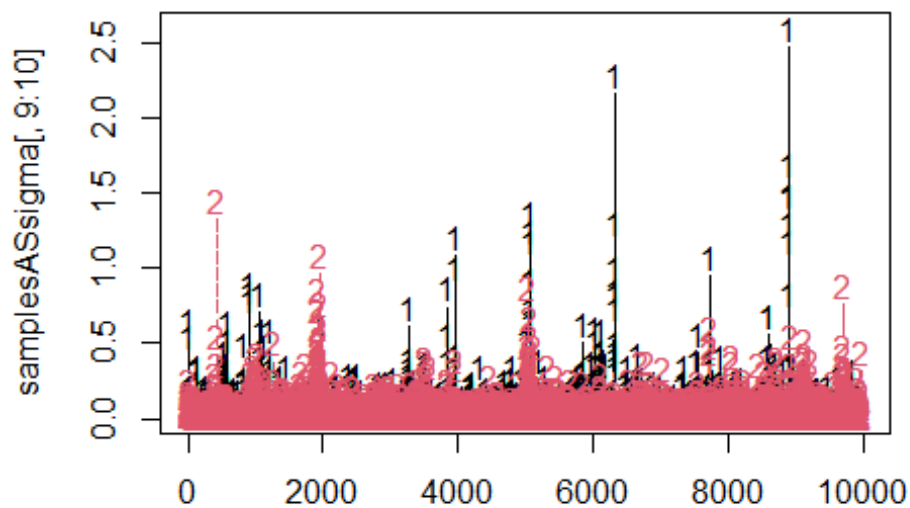
  for(i in 2:(N+1)) {
    currSample <- nmf.nextGibbsASSigma(
      X, currSample$A, currSample$S, currSample$sigma,
      alpha, beta, gamma, lambda, sigAlpha, sigBeta)
    out[[i]] <- currSample
  }
  return(out)
}

testASSigma <- nmfGibbsASSigma(testData$X, testData$A, testData$S, sigma =
rep(0.1,2), sigBeta=1e-3, N=10000)
testASSigma[[length(testASSigma)]]

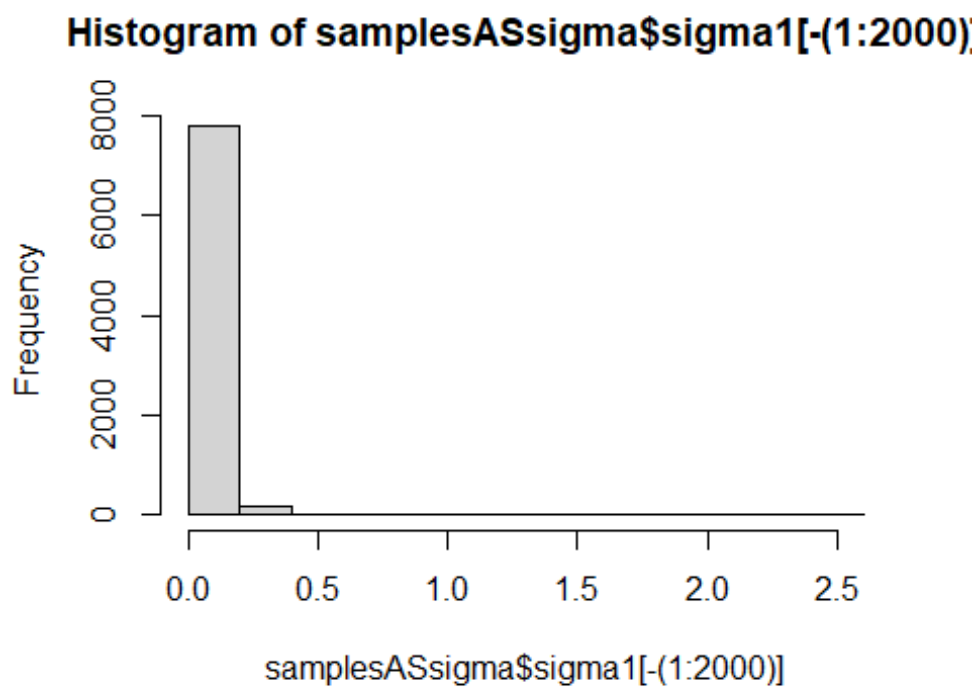
## $S
##      [,1]      [,2]
## [1,] 944.3902 3666.588
## [2,] 596.1177 1521.147
##
## $A
##      [,1]      [,2]
## [1,] 819.2391 1656.973285
## [2,] 158.9471   7.445939
##
## $sigma
## [1] 0.02531302 0.03410935

samplesASSigma <- nmfsamplesToMatrix(testASSigma)
matplot(samplesASSigma[,9:10], type = "b")

```

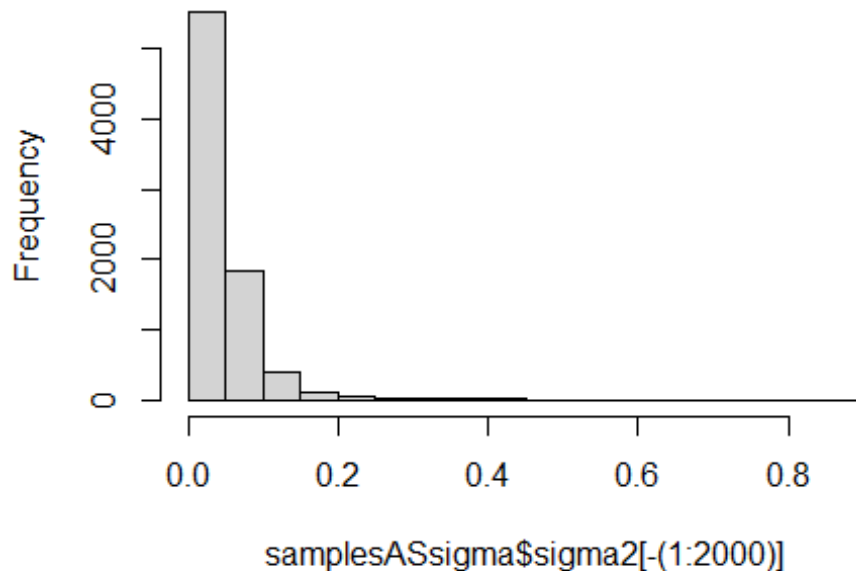


```
hist(samplesASSigma$sigma1[-(1:2000)])
```



```
hist(samplesASSigma$sigma2[-(1:2000)])
```

## Histogram of samplesASsigma\$sigma2[-(1:2000)]



```
mean(samplesASsigma$sigma1[-(1:2000)])

## [1] 0.05584959

testASsigma <- nmfGibbsASsigma(testData$X,
                               A=matrix(rep(1000,4),nrow = 2),
                               S=matrix(rep(1000,4), nrow = 2),
                               sigma = rep(1,2), sigBeta=1e-3, N=100000)
lastAS<-testASsigma[[length(testASsigma)]]

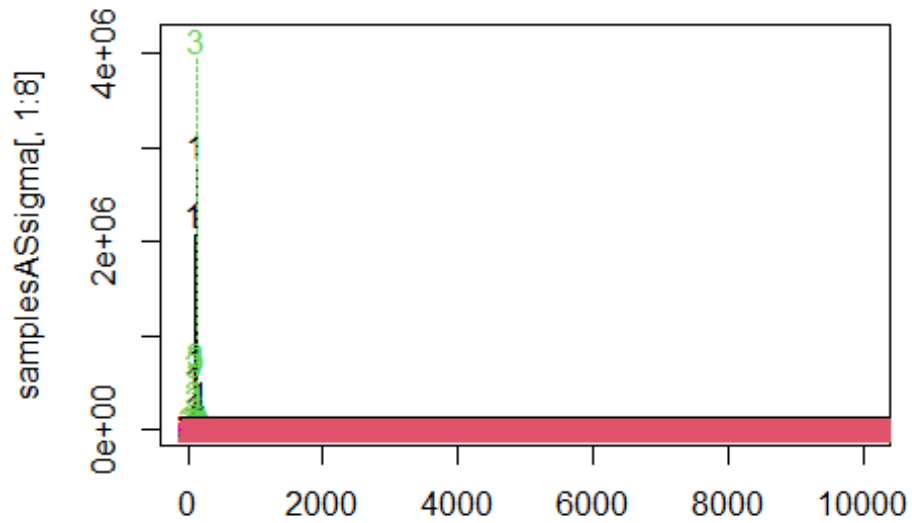
lastAS

## $S
##           [,1]      [,2]
## [1,] 14027.36286 7565.2942
## [2,]   54.44634  209.3088
##
## $A
##           [,1]      [,2]
## [1,] 2.690203e+01 25420.77
## [2,] 1.320527e-04  2838.48
##
## $sigma
## [1] 0.12220253 0.04917968
```

```

samplesASsigma <- nmfsamplesToMatrix(testASsigma)
matplot(samplesASsigma[,1:8], type = "b", xlim = c(0,10000)#, ylim=c(0,80000)
)

```

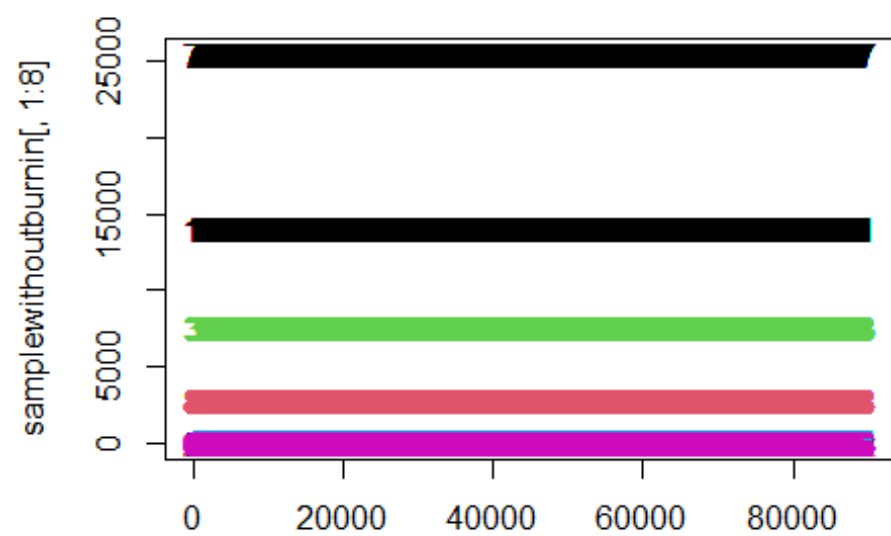


```

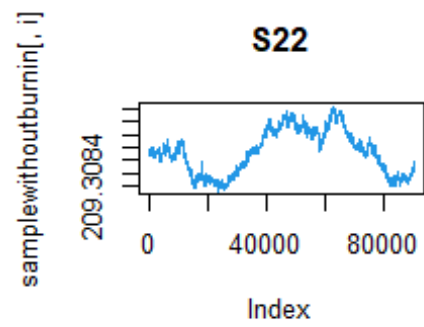
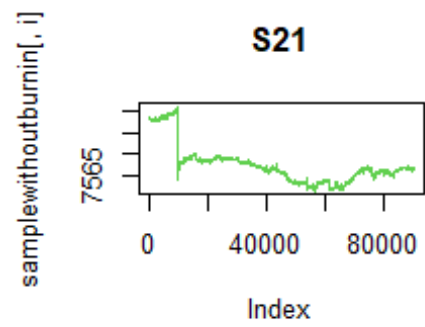
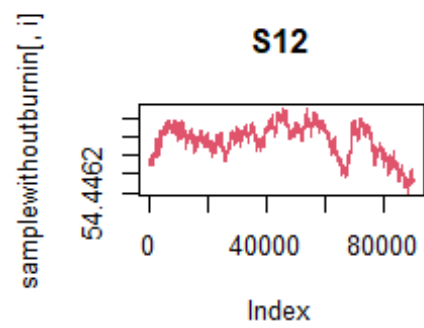
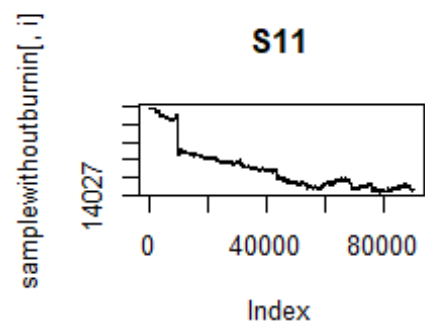
burnin <- 10000
samplewithoutburnin <- samplesASsigma[-(1:burnin),]
matplot(samplewithoutburnin[,1:8], type = "b")

```

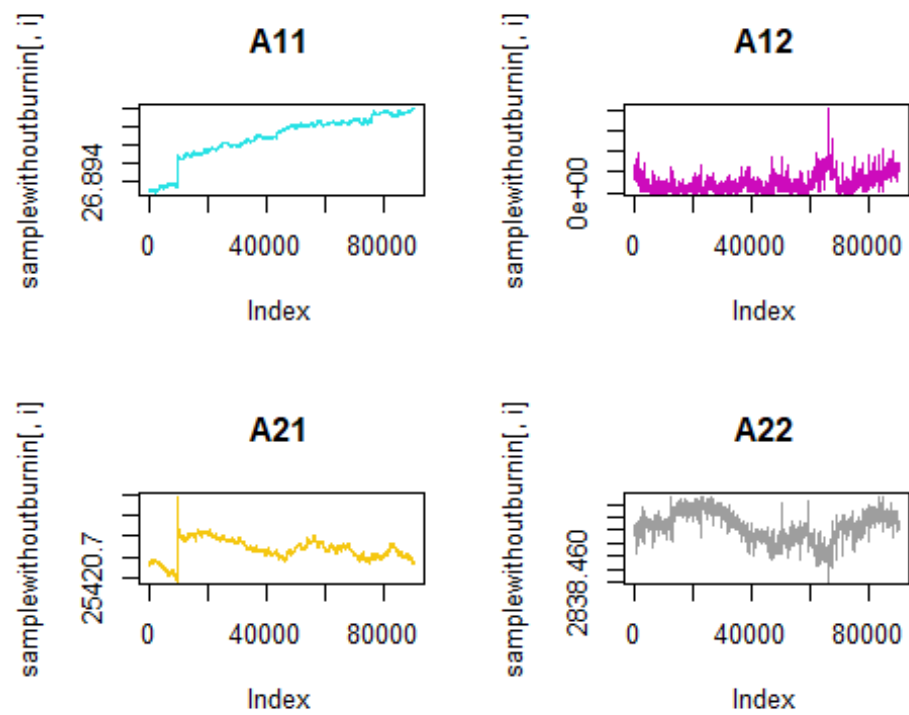




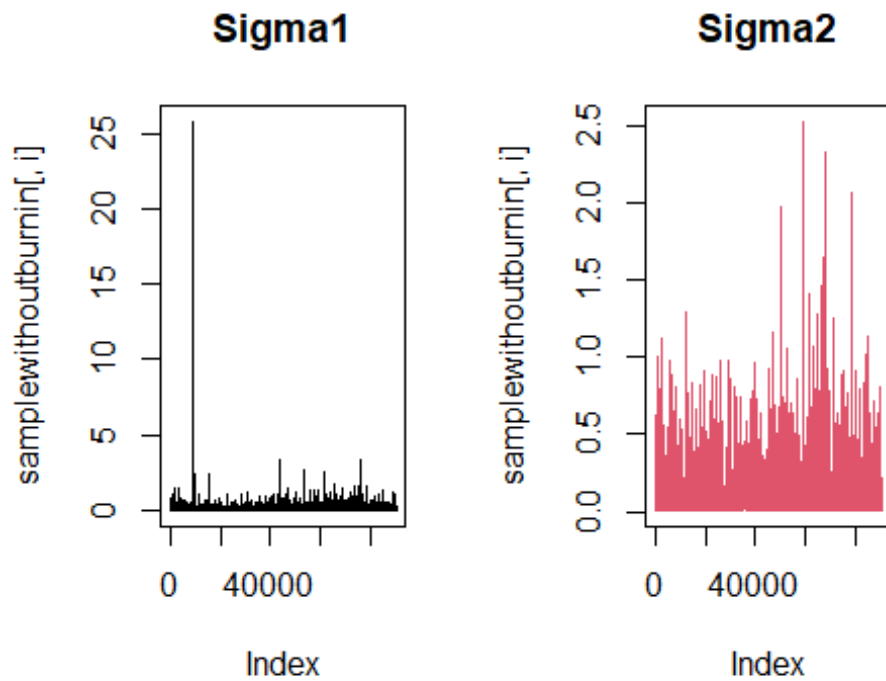
```
leg <- c("S11", "S12", "S21", "S22")
par(mfrow=c(2,2))
for (i in 1:4){
  plot(samplewithoutburnin[,i], type="l", col=i, main=leg[i])
}
```



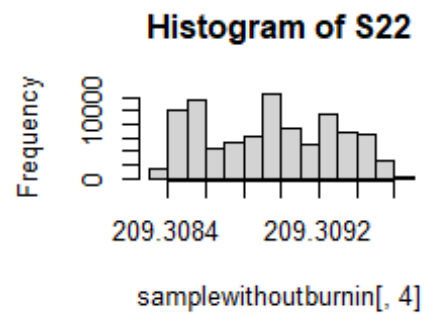
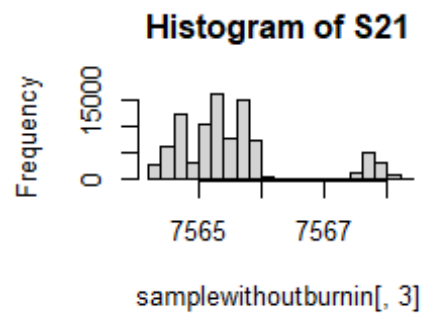
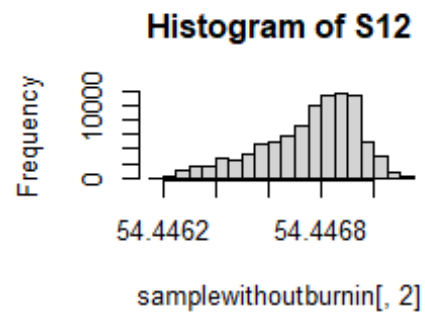
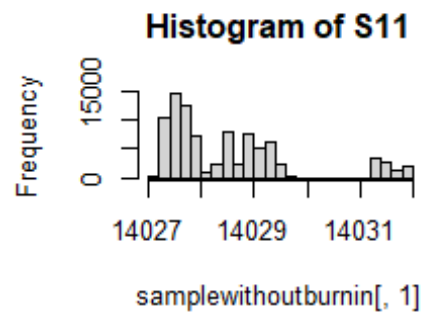
```
leg <- c("A11", "A12", "A21", "A22")
par(mfrow=c(2,2))
for (i in 5:8){
  plot(samplewithoutburnin[,i], type="l", col=i, main=leg[i-4])
}
```



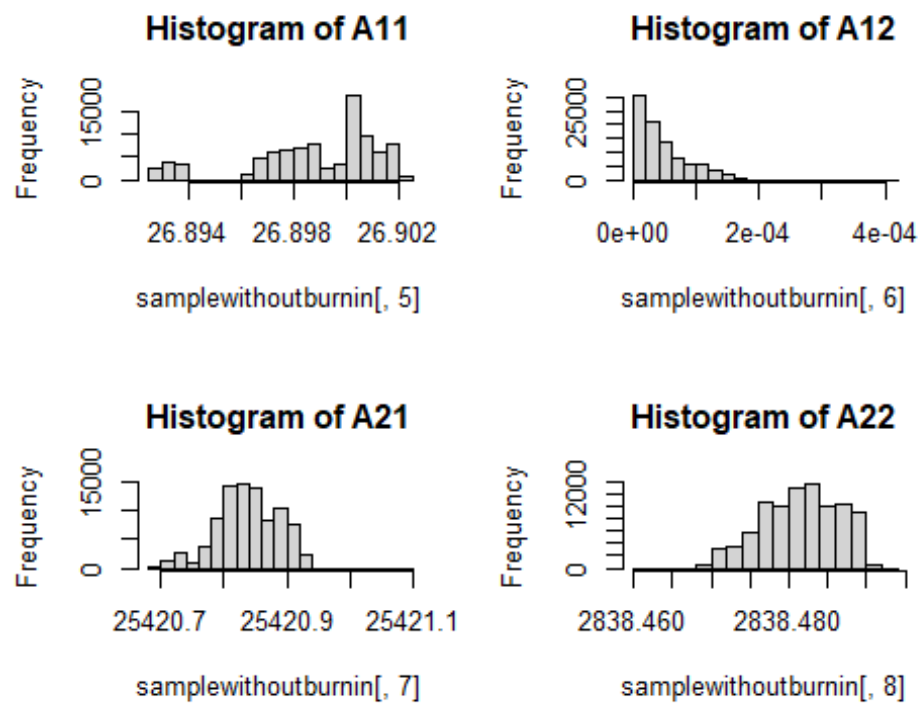
```
leg <- c("Sigma1", "Sigma2")
par(mfrow=c(1,2))
for (i in 9:10){
  plot(samplewithoutburnin[,i], type="l", col=i, main=leg[i-8])
}
```



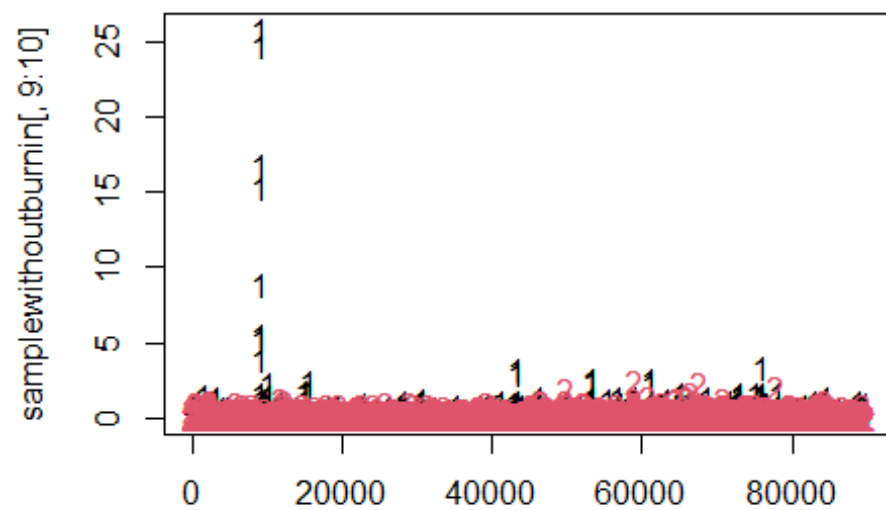
```
#Histogram for S
par(mfrow=c(2,2))
hist(samplewithoutburnin[,1], main = "Histogram of S11")
hist(samplewithoutburnin[,2], main = "Histogram of S12")
hist(samplewithoutburnin[,3], main = "Histogram of S21")
hist(samplewithoutburnin[,4], main = "Histogram of S22")
```



```
#Histogram for A
par(mfrow=c(2,2))
hist(samplewithoutburnin[,5], main = "Histogram of A11")
hist(samplewithoutburnin[,6], main = "Histogram of A12")
hist(samplewithoutburnin[,7], main = "Histogram of A21")
hist(samplewithoutburnin[,8], main = "Histogram of A22")
```



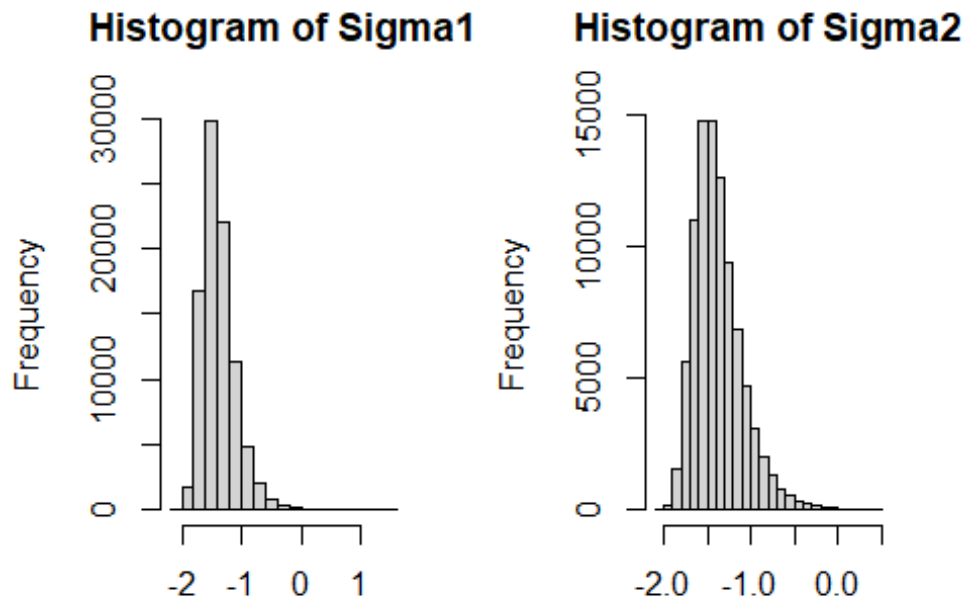
```
matplot(samplewithoutburnin[,9:10])
```



```

par(mfrow=c(1,2))
hist(log(samplewithoutburnin[,9], base = 10), main = "Histogram of Sigma1")
hist(log(samplewithoutburnin[,10], base = 10), main = "Histogram of Sigma2")

```

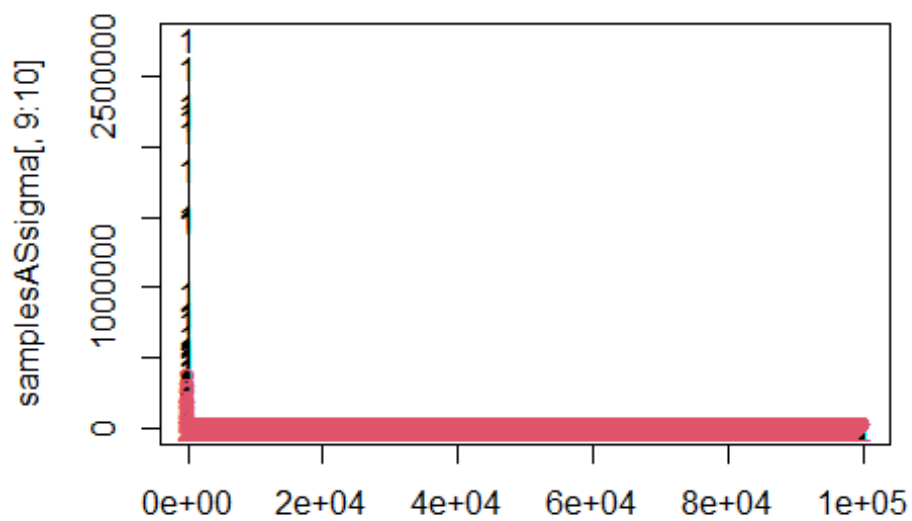


log(samplewithoutburnin[, 9], base log(samplewithoutburnin[, 10], base

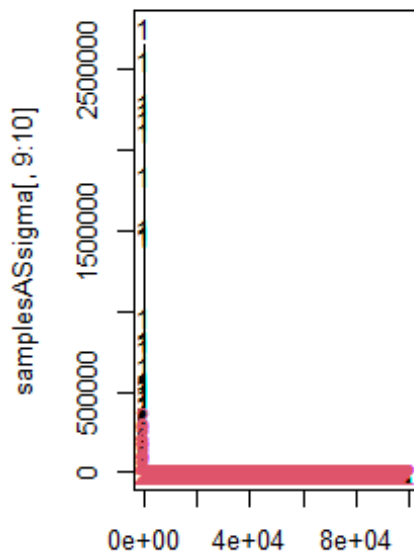
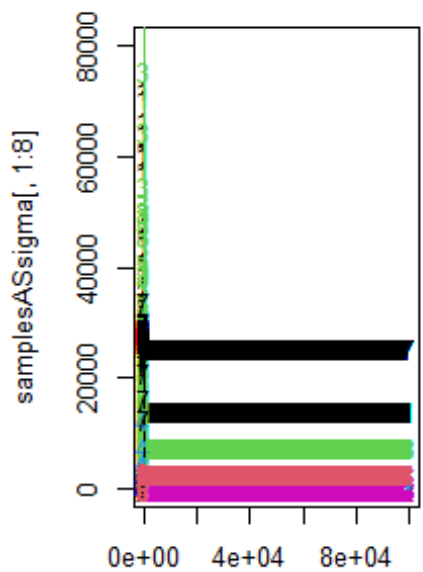
```

samplesASsigma <- nmfsamplesToMatrix(testASsigma)
matplot(samplesASsigma[,9:10], type = "b")

```



```
layout(matrix(1:2,nrow = 2,ncol = 2, byrow = TRUE))
matplot(samplesASSigma[,1:8], type = "b", ylim=c(0,80000))
matplot(samplesASSigma[,9:10], type = "b")
```





### *#Image Dataset Data Reading & Model*

```
library(NMF)

library(imager)

## Loading required package: magrittr

##
## Attaching package: 'imager'

## The following object is masked from 'package:magrittr':
##
##      add

## The following object is masked from 'package:Biobase':
##
##      channel

## The following object is masked from 'package:BiocGenerics':
##
##      width

## The following objects are masked from 'package:VGAM':
##
##      fill, renorm

## The following objects are masked from 'package:stats':
##
##      convolve, spectrum

## The following object is masked from 'package:graphics':
##
##      frame

## The following object is masked from 'package:base':
##
##      save.image

library(tidyverse)

## -- Attaching packages ----- tidyverse
1.3.1 --

## v ggplot2 3.3.5      v purrr  0.3.4
## v tibble  3.1.5      v dplyr  1.0.7
## v tidyr   1.1.4      v stringr 1.4.0
## v readr   2.1.1      v forcats 0.5.1

## -- Conflicts -----
tidyverse_conflicts() --
## x imager::add()      masks magrittr::add()
## x stringr::boundary() masks imager::boundary()
## x dplyr::combine()   masks Biobase::combine(), BiocGenerics::combine()
```

```

## x tidyr::extract()      masks magrittr::extract()
## x tidyr::fill()        masks imager::fill(), VGAM::fill()
## x dplyr::filter()      masks stats::filter()
## x dplyr::lag()          masks stats::lag()
## x ggplot2::Position()  masks BiocGenerics::Position(), base::Position()
## x purrr::set_names()   masks magrittr::set_names()

imgs <- load.dir("imgs_bss")

img_mat <- map_df(imgs, as.vector) %>% as.matrix() %>% t()

mdl_nmf <- nmf(t(img_mat), 4, "brunet")

S <- basis(mdl_nmf)
A <- coef(mdl_nmf)

#Image Dataset
img_matA <- matrix(runif(n=nrow(img_mat)*4), nrow = nrow(img_mat))
img_matS <- matrix(runif(n=ncol(img_mat)*4), ncol = ncol(img_mat))
#AS <- nmf.nextGibbsAS(img_mat, img_matA, img_matS)
AS <- nmf.nextGibbsAS(img_mat, t(A), t(S))
AS

## $S
##           [,1]      [,2]      [,3]      [,4]      [,5]      [,6]
## [1,] 0.1550069 0.10331345 0.1788992 0.3040006 0.2153337 0.1135186
##      0.1411615
## [2,] 0.5993678 0.59742295 0.5848718 0.5777309 0.5812729 0.5726009
##      0.5664899
## [3,] 0.2916614 0.30027469 0.2875180 0.3034323 0.3166964 0.2709609
##      0.2998195
## [4,] 0.0351977 0.02776469 0.1116942 0.1428639 0.2327122 0.2644980
##      0.2516626
##           [,8]      [,9]      [,10]      [,11]      [,12]      [,13]      [,14]
## [1,] 0.4389023 0.3554444 0.1807795 0.1575101 0.1368779 0.3126417 0.2915375
## [2,] 0.5807780 0.5558915 0.5973879 0.5897313 0.5870381 0.6086176 0.6160160
## [3,] 0.3400871 0.3224219 0.3295054 0.3013717 0.3476414 0.4387809 0.4761911
## [4,] 0.4240592 0.3733691 0.3264134 0.4304061 0.4676537 0.4157082 0.3966477
##           [,15]      [,16]      [,17]      [,18]      [,19]      [,20]      [,21]
## [1,] 0.1100240 0.1246762 0.1407278 0.1039322 0.1485965 0.1042117 0.0926861
## [2,] 0.6200191 0.6213544 0.6125523 0.6367530 0.6477295 0.6625124 0.6483076
## [3,] 0.4071166 0.3279798 0.3130984 0.3326208 0.3455684 0.3640972 0.3555983
## [4,] 0.3553454 0.3490665 0.4002513 0.5595929 0.5559077 0.4916525 0.3535120
##           [,22]      [,23]      [,24]      [,25]      [,26]      [,27]
## [1,] 0.12783009 0.10330835 0.07801917 0.0904168 0.09368765 0.0753465
##      0.03628625
## [2,] 0.62258956 0.62147179 0.62346033 0.6209349 0.63475778 0.6124799
##      0.63901676

```

```

## [3,] 0.31757279 0.27465137 0.31889204 0.3337102 0.34719363 0.4473605
0.38893520
## [4,] 0.05172967 0.01091683 0.03510642 0.1463152 0.24814916 0.3548176
0.41573875
##          [,29]      [,30]      [,31]      [,32]      [,33]      [,34]
## [1,] 0.03673624 0.05659558 0.08741945 0.07186589 0.08606758 0.04570575
## [2,] 0.64921938 0.66401784 0.71271736 0.72783652 0.79098042 0.79073459
## [3,] 0.39882542 0.45529678 0.45721593 0.45738844 0.39831437 0.34866383
## [4,] 0.42649383 0.46235368 0.40523206 0.45867570 0.50257409 0.26955897
##          [,35]      [,36]      [,37]      [,38]      [,39]      [,40]
## [1,] 0.02786753 0.08630659 0.1004520 0.07552340 0.096624326 0.07194593
## [2,] 0.80091306 0.78438663 0.7426470 0.73269327 0.716644990 0.72098770
## [3,] 0.30734063 0.31431214 0.2895766 0.22962692 0.222570812 0.24295507
## [4,] 0.32965124 0.35753677 0.1410908 0.09374934 0.002929827 0.22044821
##          [,41]      [,42]      [,43]      [,44]      [,45]      [,46]
## [1,] 0.03147764 0.2276181 0.2647211 0.2104699 0.2344546 0.1731426
0.05278958
## [2,] 0.70727161 0.6836458 0.6889486 0.6959461 0.6794971 0.7126009
0.69908698
## [3,] 0.26936213 0.3159206 0.2870495 0.3010206 0.3217136 0.3006626
0.29779155
## [4,] 0.52904696 0.4920706 0.4713597 0.4982757 0.4639566 0.4378057
0.46095503
##          [,48]      [,49]      [,50]      [,51]      [,52]      [,53]
## [1,] 0.02281377 0.1104801 0.2029753 0.14992796 0.1988350 0.2032093
0.2680064
## [2,] 0.70704697 0.6742385 0.6682656 0.60565087 0.5822370 0.5968608
0.5897495
## [3,] 0.32920416 0.3911593 0.4251283 0.28154333 0.3156028 0.3345480
0.3545130
## [4,] 0.43722118 0.4011698 0.4200786 0.09166121 0.0675686 0.1462656
0.1921122
##          [,55]      [,56]      [,57]      [,58]      [,59]      [,60]      [,61]
## [1,] 0.2389014 0.2057531 0.2330096 0.2297285 0.3697154 0.2127825 0.1091251
## [2,] 0.5875095 0.5743447 0.5728015 0.6153693 0.6037448 0.5873117 0.5883825
## [3,] 0.3323813 0.2907694 0.3451583 0.3091072 0.3072486 0.3160509 0.2920533
## [4,] 0.2397073 0.2725409 0.4041601 0.4051793 0.3309567 0.3105094 0.3561374
##          [,62]      [,63]      [,64]      [,65]      [,66]      [,67]      [,68]
## [1,] 0.3412218 0.6734057 0.3612291 0.1063026 0.1187667 0.1702615 0.1692231
## [2,] 0.5984258 0.6249466 0.6444695 0.6347183 0.6197425 0.6320197 0.6444570
## [3,] 0.3520085 0.4155290 0.3949442 0.3361482 0.3404863 0.3451536 0.3623752
## [4,] 0.4331274 0.4684162 0.4211838 0.3842005 0.4293805 0.4320943 0.5930877
##          [,69]      [,70]      [,71]      [,72]      [,73]      [,74]
## [1,] 0.1207664 0.2535493 0.2850176 0.08541955 0.04325089 0.07343741
0.04692311
## [2,] 0.6438955 0.6501148 0.6475350 0.63301857 0.64306257 0.65999305
0.66101520

```

```

## [3,] 0.3455349 0.3984962 0.4025748 0.35763598 0.32254332 0.35911797
0.43897895
## [4,] 0.4916568 0.4356771 0.4171739 0.23957688 0.02607558 0.08984297
0.23520464
##          [,76]          [,77]          [,78]          [,79]          [,80]          [,81]
[,82]
## [1,] 0.07486377 0.05707916 0.04535383 0.01923848 0.02374314 0.1032022
0.1266752
## [2,] 0.66598456 0.68343810 0.72646080 0.73581410 0.73560019 0.7639645
0.7876897
## [3,] 0.38316255 0.42506873 0.41776150 0.41894216 0.42652942 0.4319181
0.4610853
## [4,] 0.27097447 0.41001639 0.36758229 0.45620470 0.43079581 0.3634378
0.4254911
##          [,83]          [,84]          [,85]          [,86]          [,87]          [,88]
## [1,] 0.05315007 0.05264711 0.02290756 0.05126953 0.07376151 0.106002688
## [2,] 0.78965533 0.76786526 0.76324433 0.71585047 0.71162864 0.687132217
## [3,] 0.41538580 0.37820082 0.37285550 0.42992017 0.37894146 0.314662342
## [4,] 0.44965848 0.30534252 0.36056484 0.39925793 0.21412298 0.002598246
##          [,89]          [,90]          [,91]          [,92]          [,93]          [,94]
## [1,] 0.06844825 0.01307579 0.001626539 0.09187954 0.1472103 0.09685407
## [2,] 0.70323085 0.66493492 0.706149715 0.72102048 0.7169895 0.71432691
## [3,] 0.23487426 0.27303143 0.311574865 0.30173405 0.2977145 0.29850647
## [4,] 0.03163256 0.40155745 0.446159553 0.47903075 0.4824345 0.44017778
##          [,95]          [,96]          [,97]          [,98]          [,99]          [,100]
[,101]
## [1,] 0.07897375 0.1047938 0.08896691 0.02161101 0.1114549 0.09577278
0.24513777
## [2,] 0.71394492 0.7023928 0.68526415 0.68965898 0.6715579 0.66406814
0.62197437
## [3,] 0.29439017 0.2957933 0.32008795 0.34623616 0.3669020 0.36738885
0.33798159
## [4,] 0.46525825 0.4788027 0.47893302 0.45366922 0.4357076 0.41278581
0.03699156
##          [,102]          [,103]          [,104]          [,105]          [,106]          [,107]
[,108]
## [1,] 0.287912352 0.19640327 0.1638036 0.2611655 0.2474937 0.3331947
0.2679576
## [2,] 0.625881246 0.63483758 0.6132877 0.6167890 0.6165166 0.5883834
0.6010901
## [3,] 0.315265610 0.34527360 0.3826043 0.3660845 0.3321532 0.3699269
0.3543885
## [4,] 0.008914656 0.07257545 0.1618052 0.2374459 0.3229500 0.4596895
0.4293589
##          [,109]          [,110]          [,111]          [,112]          [,113]          [,114]
[,115]
## [1,] 0.3710568 0.3132679 0.3396609 0.3417892 0.2567301 0.07349703
0.1347851
## [2,] 0.6159239 0.6219398 0.6325641 0.6571549 0.6656445 0.67149394
0.6332107

```

```

## [3,] 0.3822892 0.3672718 0.3543381 0.3491543 0.3755858 0.33042536
0.3304287
## [4,] 0.3977001 0.3964829 0.4063315 0.4107663 0.3986197 0.40187304
0.4057975
##      [,116]      [,117]      [,118]      [,119]      [,120]      [,121]
[,122]
## [1,] 0.1720274 0.1271231 0.08175829 0.09425363 0.2133451 0.2610030
0.0793783
## [2,] 0.6534077 0.6320313 0.63605086 0.63902198 0.6214732 0.6285194
0.6341743
## [3,] 0.3131714 0.3534612 0.35094371 0.34845768 0.3551384 0.3787944
0.3643410
## [4,] 0.4402467 0.5139739 0.49969194 0.42004990 0.4493678 0.3970702
0.3748508
##      [,123]      [,124]      [,125]      [,126]      [,127]      [,128]
## [1,] 0.02748707 0.04437670 0.05504557 0.05293781 0.02067801 0.04226754
## [2,] 0.68263006 0.70160370 0.74109132 0.74637164 0.76400182 0.77431825
## [3,] 0.34504367 0.36746174 0.44391187 0.36082620 0.35604170 0.41288449
## [4,] 0.17198810 0.09577917 0.23235603 0.17457552 0.39627432 0.48629947
##      [,129]      [,130]      [,131]      [,132]      [,133]      [,134]
[,135]
## [1,] 0.07629121 0.08979483 0.1016257 0.0944823 0.07930853 0.06271962
0.03934513
## [2,] 0.77025111 0.74970891 0.7545354 0.7602684 0.71911974 0.70765082
0.69724280
## [3,] 0.39567614 0.41845824 0.4034544 0.3898924 0.39671972 0.38364633
0.42020368
## [4,] 0.39993680 0.40493343 0.4294710 0.3850446 0.41000634 0.40461953
0.46092251
##      [,136]      [,137]      [,138]      [,139]      [,140]      [,141]
## [1,] 0.04224796 0.0633605 0.07921816 0.09930636 0.04279868 0.003368239
## [2,] 0.69051617 0.6992355 0.73152255 0.70699046 0.71360841 0.699310899
## [3,] 0.44284465 0.4398467 0.36621508 0.34263811 0.28427286 0.303615297
## [4,] 0.44746052 0.4136315 0.28753349 0.27405682 0.40852844 0.433457465
##      [,142]      [,143]      [,144]      [,145]      [,146]      [,147]
## [1,] 0.00557092 0.06009855 0.05759256 0.04234278 0.06368777 0.1028306
## [2,] 0.73953652 0.73339357 0.71809190 0.69521585 0.68555070 0.6763571
## [3,] 0.29642012 0.29675157 0.28683533 0.29602902 0.32499858 0.3315841
## [4,] 0.46506526 0.47396505 0.45914358 0.45673210 0.47753459 0.4688868
##      [,148]      [,149]      [,150]      [,151]      [,152]      [,153]
## [1,] 0.06459884 0.05603947 0.02113899 0.19427786 0.28026075 0.22657654
## [2,] 0.66320600 0.65545148 0.66247236 0.62737483 0.61192597 0.61660045
## [3,] 0.34127206 0.34668887 0.31571018 0.38051578 0.34929773 0.35174499
## [4,] 0.41787153 0.40501255 0.39589813 0.07181542 0.01047131 0.01991377
##      [,154]      [,155]      [,156]      [,157]      [,158]      [,159]      [,160]
## [1,] 0.1722016 0.2668813 0.2004334 0.2107521 0.2563855 0.1551328 0.2612623
## [2,] 0.6227896 0.6184835 0.6127676 0.6089389 0.6136512 0.6548575 0.6470482
## [3,] 0.3750330 0.3578070 0.3592119 0.3903831 0.3754656 0.3838822 0.4144891
## [4,] 0.1893656 0.4049698 0.5353216 0.5582832 0.4983419 0.3918912 0.4168141
##      [,161]      [,162]      [,163]      [,164]      [,165]      [,166]

```

```

[,167]
## [1,] 0.2902235 0.2019669 0.1311784 0.04994628 0.08194996 0.1341321
0.1786262
## [2,] 0.6519411 0.6624711 0.6765258 0.65852143 0.64606683 0.6532016
0.6595536
## [3,] 0.4061287 0.3921037 0.3736138 0.35178946 0.33802533 0.3507434
0.3884543
## [4,] 0.4240357 0.4213254 0.4338227 0.43255153 0.42879532 0.4307763
0.4446077
##          [,168]      [,169]      [,170]      [,171]      [,172]      [,173]
## [1,] 0.08881723 0.08700092 0.06581791 0.00153955 0.07798609 0.04872603
## [2,] 0.66275632 0.69878379 0.66714997 0.69453251 0.69538970 0.72973657
## [3,] 0.42093512 0.39022043 0.31498583 0.30945603 0.33826908 0.32350584
## [4,] 0.42153105 0.40248752 0.38531100 0.39450981 0.35303988 0.31415903
##          [,174]      [,175]      [,176]      [,177]      [,178]      [,179]
## [1,] 0.05144149 0.08021922 0.093914443 0.08297822 0.07928731 0.05542875
## [2,] 0.74740024 0.76225472 0.769657101 0.76391162 0.73811349 0.73504167
## [3,] 0.30180976 0.30396634 0.325450637 0.31120315 0.36294687 0.33472015
## [4,] 0.19245159 0.20764177 0.003791113 0.17675891 0.47255911 0.46728554
##          [,180]      [,181]      [,182]      [,183]      [,184]      [,185]
## [1,] 0.06505964 0.08477844 0.1133173 0.07691518 0.02775865 0.04224579
## [2,] 0.73488955 0.73260747 0.7102545 0.71437006 0.69918748 0.72401518
## [3,] 0.34172427 0.36893307 0.3521519 0.36008996 0.40590214 0.41046903
## [4,] 0.39103379 0.39056027 0.4280453 0.47164582 0.56670964 0.54720458
##          [,186]      [,187]      [,188]      [,189]      [,190]      [,191]
## [1,] 0.06206844 0.04341023 0.08308535 0.08668826 0.0376485 0.01186236
## [2,] 0.71696167 0.72913104 0.72369010 0.73223280 0.7297691 0.72760521
## [3,] 0.42282545 0.41674130 0.38947194 0.35347287 0.3053280 0.29588534
## [4,] 0.49688952 0.54486985 0.55372832 0.48794606 0.3981837 0.42053742
##          [,192]      [,193]      [,194]      [,195]      [,196]      [,197]
## [1,] 0.02588456 0.05918813 0.03372718 0.04549407 0.05162773 0.1403582
## [2,] 0.73524660 0.73764177 0.71994048 0.69858314 0.69952504 0.6644072
## [3,] 0.29883939 0.29019740 0.30505297 0.30926681 0.32146278 0.3826650
## [4,] 0.47138297 0.47335708 0.43004508 0.45502477 0.51797835 0.4353662
##          [,198]      [,199]      [,200]      [,201]      [,202]      [,203]
## [1,] 0.09419105 0.08754106 0.06402357 0.1702879 0.12611165 0.111817087
## [2,] 0.67849727 0.64748173 0.64678158 0.6163712 0.64106234 0.626011305
## [3,] 0.37579621 0.37120044 0.35569282 0.3875655 0.35946831 0.286720205
## [4,] 0.39779680 0.43832200 0.44590049 0.1606809 0.03526122 0.001845536
##          [,204]      [,205]      [,206]      [,207]      [,208]      [,209]      [,210]
## [1,] 0.1467601 0.2657040 0.3897081 0.2873390 0.2483153 0.2398224 0.4911650
## [2,] 0.6609306 0.6477310 0.6378194 0.6684670 0.6824924 0.6836957 0.6842847
## [3,] 0.2965821 0.3653433 0.3686317 0.3532502 0.3480323 0.3730171 0.4398272
## [4,] 0.1435465 0.4132553 0.5052538 0.5627150 0.4783968 0.4872243 0.5079329
##          [,211]      [,212]      [,213]      [,214]      [,215]      [,216]
##          [,217]
## [1,] 0.3775845 0.2662376 0.3079896 0.1702300 0.0324171 0.0621721
0.06924606
## [2,] 0.7057671 0.6549270 0.6747227 0.6751890 0.6926144 0.7294862
0.71331388

```

```
## [3,] 0.4179566 0.4146976 0.4265051 0.4232031 0.4427002 0.4467841
0.50962434
## [4,] 0.4553607 0.4233489 0.4502927 0.4669519 0.4291928 0.3892253
0.44354061
##      [,218]      [,219]      [,220]      [,221]      [,222]      [,223]
## [1,] 0.07462846 0.08744256 0.05454621 0.06444254 0.0584989 0.04012142
## [2,] 0.73589565 0.72338498 0.72435977 0.72210228 0.7447141 0.77255165
## [3,] 0.47693596 0.42567893 0.33788030 0.32099179 0.3122711 0.33812292
## [4,] 0.43630868 0.38965404 0.40043812 0.40804593 0.3465901 0.36458901
##      [,224]      [,225]      [,226]      [,227]      [,228]      [,229]
## [1,] 0.05823159 0.05093398 0.08583928 0.094057482 0.06793853 0.04909312
## [2,] 0.77452374 0.77296120 0.77549187 0.757414538 0.73661446 0.71605518
## [3,] 0.31433147 0.24159641 0.37789351 0.354974844 0.33848549 0.32842572
## [4,] 0.32578595 0.19441672 0.01302161 0.002881581 0.17542572 0.39378488
##      [,230]      [,231]      [,232]      [,233]      [,234]      [,235]
## [1,] 0.02417674 0.06952198 0.1203903 0.06711204 0.001576019 0.05044106
## [2,] 0.71890624 0.73620814 0.7066883 0.70858051 0.734605515 0.73057390
## [3,] 0.33166015 0.32603360 0.3221393 0.39504768 0.440639874 0.48540685
## [4,] 0.34366372 0.32149071 0.4116927 0.52078434 0.581315282 0.47537365
##      [,236]      [,237]      [,238]      [,239]      [,240]      [,241]
## [1,] 0.06885396 0.04162479 0.08106816 0.1138009 0.02760576 0.01097553
## [2,] 0.74668980 0.73366453 0.73207363 0.7393422 0.73850677 0.73659759
## [3,] 0.49832692 0.46468011 0.42786183 0.3692384 0.34259640 0.29700798
## [4,] 0.50408808 0.51965263 0.48311154 0.4208120 0.38364324 0.43245112
##      [,242]      [,243]      [,244]      [,245]      [,246]      [,247]
##      [,248]
## [1,] 0.03105612 0.02969988 0.01449084 0.02173546 0.06966396 0.1514514
0.1057347
## [2,] 0.70355992 0.68055192 0.66228388 0.66420230 0.65039934 0.6386725
0.6316029
## [3,] 0.30243515 0.31287875 0.31491488 0.31801222 0.36425723 0.4143262
0.4072226
## [4,] 0.45125231 0.44876575 0.42872992 0.48447430 0.51120950 0.4977126
0.4567598
##      [,249]      [,250]      [,251]      [,252]      [,253]      [,254]
##      [,255]
## [1,] 0.07622593 0.05093729 0.1540106 0.14424785 0.14975270 0.1399268
0.2410119
## [2,] 0.59807710 0.59986242 0.6142531 0.62807411 0.64086404 0.6433115
0.6400244
## [3,] 0.40814867 0.40924578 0.4078331 0.39418933 0.35788252 0.3049449
0.3302164
## [4,] 0.46961120 0.41212461 0.1917479 0.07087713 0.06636543 0.2447923
0.3859234
##      [,256]      [,257]      [,258]      [,259]      [,260]      [,261]      [,262]
## [1,] 0.3678759 0.2637988 0.2955316 0.2472661 0.1985074 0.1140385 0.1264469
## [2,] 0.6552482 0.6796933 0.6977370 0.6923255 0.6929491 0.7091672 0.6582967
## [3,] 0.3597514 0.3457471 0.3639065 0.3918697 0.4166805 0.3833244 0.4075388
## [4,] 0.3845064 0.4566486 0.4769121 0.4730529 0.4432627 0.4226328 0.4334151
##      [,263]      [,264]      [,265]      [,266]      [,267]      [,268]
```

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[,269]
## [1,] 0.1650608 0.2367779 0.1946828 0.1870528 0.1852475 0.1415182
0.04206796
## [2,] 0.6949915 0.7092169 0.7442311 0.7437457 0.7280999 0.7352117
0.71657553
## [3,] 0.4441309 0.4849154 0.5258071 0.5304919 0.4783647 0.4293369
0.38627408
## [4,] 0.4216096 0.4623701 0.4851609 0.4294039 0.4407484 0.4329819
0.39129453
##          [,270]      [,271]      [,272]      [,273]      [,274]      [,275]
## [1,] 0.03819597 0.0568582 0.04698198 0.02933175 0.04424779 0.07622434
## [2,] 0.72431585 0.7123094 0.71605258 0.75672473 0.75961298 0.75640517
## [3,] 0.36714204 0.3554410 0.33754721 0.31404923 0.21665259 0.14309969
## [4,] 0.39430328 0.3128946 0.28440798 0.21354140 0.27307148 0.07968140
##          [,276]      [,277]      [,278]      [,279]      [,280]      [,281]
## [1,] 0.036866205 0.05929813 0.06663959 0.08709038 0.09715731 0.1010084
## [2,] 0.748454033 0.76572405 0.73068525 0.71504609 0.72001107 0.7088876
## [3,] 0.288911065 0.44909864 0.45293903 0.43554125 0.34936560 0.3243618
## [4,] 0.004097105 0.01064479 0.17392289 0.27557649 0.27533089 0.2365992
##          [,282]      [,283]      [,284]      [,285]      [,286]      [,287]
[,288]
## [1,] 0.1088427 0.09178912 0.04115916 0.0546112 0.07835172 0.02880381
0.1034968
## [2,] 0.7005326 0.69587598 0.71332283 0.7560245 0.73670051 0.76159557
0.7481357
## [3,] 0.3566788 0.41459831 0.50240436 0.5428021 0.59532383 0.54703537
0.5068310
## [4,] 0.3240460 0.40288701 0.48222557 0.4088142 0.41342185 0.37599640
0.3428916
##          [,289]      [,290]      [,291]      [,292]      [,293]      [,294]
## [1,] 0.1415288 0.06404984 0.05490873 0.01824494 0.02152488 0.05198727
## [2,] 0.7545769 0.73520194 0.69137692 0.67722692 0.63909932 0.61329702
## [3,] 0.4798108 0.45639289 0.38778789 0.33032960 0.33357581 0.36113938
## [4,] 0.2554700 0.38108770 0.43919932 0.42397319 0.42990120 0.45679869
##          [,295]      [,296]      [,297]      [,298]      [,299]      [,300]
[,301]
## [1,] 0.05789872 0.07256343 0.1949103 0.1108542 0.08191295 0.01484837
0.1061802
## [2,] 0.63544203 0.63978995 0.6401372 0.6245987 0.60374598 0.59199024
0.6076022
## [3,] 0.36233872 0.40323345 0.4118377 0.4116220 0.35889050 0.37631275
0.4225384
## [4,] 0.48755453 0.52021975 0.4962145 0.4630146 0.48325311 0.43137316
0.1740422
##          [,302]      [,303]      [,304]      [,305]      [,306]      [,307]      [,308]
## [1,] 0.1192120 0.1222600 0.1650620 0.3392158 0.2828124 0.1668978 0.1811273
## [2,] 0.6206592 0.6048823 0.6390472 0.6430212 0.6412532 0.6571205 0.6681721
## [3,] 0.4340494 0.4555957 0.3889111 0.3742543 0.3863484 0.3480156 0.3847866
## [4,] 0.1873606 0.3447052 0.4298147 0.4542523 0.4277623 0.3772036 0.4258242
##          [,309]      [,310]      [,311]      [,312]      [,313]      [,314]

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```
[,315]
## [1,] 0.1905491 0.09341629 0.1182977 0.08965572 0.1802261 0.4804076
0.6175826
## [2,] 0.6652728 0.67418971 0.6749188 0.70043587 0.7155631 0.7449748
0.7263138
## [3,] 0.4269339 0.42701366 0.4114537 0.39202564 0.4548918 0.5064502
0.5617733
## [4,] 0.4395875 0.46024820 0.4641930 0.42883938 0.3947300 0.4280300
0.4810437
##      [,316]      [,317]      [,318]      [,319]      [,320]      [,321]
[,322]
## [1,] 0.5137106 0.2116810 0.1180834 0.08091347 0.04571476 0.02903468
0.0528696
## [2,] 0.7338724 0.7274061 0.7340062 0.72097389 0.72193900 0.71724845
0.7134723
## [3,] 0.5236779 0.4983788 0.4298421 0.37376100 0.38277000 0.40887632
0.4200417
## [4,] 0.4579815 0.3858523 0.3800865 0.30159442 0.37903458 0.61851122
0.7822518
##      [,323]      [,324]      [,325]      [,326]      [,327]      [,328]
[,329]
## [1,] 0.03545757 0.00546092 0.007572788 0.03571965 0.1142509 0.1004084
0.1250025
## [2,] 0.74023572 0.73080515 0.711618279 0.74294767 0.7353101 0.7412392
0.7375181
## [3,] 0.41864195 0.15572797 0.160965797 0.30779704 0.5032070 0.5016664
0.4800194
## [4,] 0.53134888 0.41214212 0.477988205 0.26602520 0.1332595 0.3332159
0.3757632
##      [,330]      [,331]      [,332]      [,333]      [,334]      [,335]
[,336]
## [1,] 0.1362700 0.1208785 0.1366808 0.09770606 0.06207876 0.02626961
0.05925279
## [2,] 0.7080506 0.6961440 0.7275346 0.73172860 0.74109414 0.75485556
0.75344807
## [3,] 0.4027441 0.3932278 0.3823670 0.46368306 0.51392521 0.57220474
0.57614450
## [4,] 0.6120357 0.5225566 0.2604907 0.35938705 0.33409485 0.32623142
0.23693663
##      [,337]      [,338]      [,339]      [,340]      [,341]      [,342]
[,343]
## [1,] 0.0757712 0.09806441 0.1228352 0.1017553 0.09752237 0.05234188
0.05952505
## [2,] 0.7436511 0.72708591 0.7228771 0.7107710 0.68214139 0.67552713
0.66356021
## [3,] 0.5659421 0.59393706 0.5647588 0.5424967 0.48240148 0.39809891
0.36319847
## [4,] 0.1633895 0.18663618 0.2195962 0.3653818 0.40210472 0.42911027
0.45249200
##      [,344]      [,345]      [,346]      [,347]      [,348]      [,349]
```

```
[,350]
## [1,] 0.1036943 0.1175453 0.09364983 0.2187691 0.1334478 0.0833588
0.02844085
## [2,] 0.6654814 0.6698522 0.68670574 0.6929882 0.6904519 0.6685758
0.67708065
## [3,] 0.4096772 0.4080800 0.40414983 0.4033885 0.3869496 0.3861451
0.39331597
## [4,] 0.4865644 0.4956689 0.48377371 0.4907985 0.4732542 0.4721305
0.48088029
##      [,351]      [,352]      [,353]      [,354]      [,355]      [,356]      [,357]
## [1,] 0.1493109 0.1073284 0.1766006 0.3078879 0.4713719 0.3599739 0.3271001
## [2,] 0.6429211 0.6330337 0.6437749 0.6346563 0.6583131 0.6685445 0.6846129
## [3,] 0.4243578 0.4472573 0.4510909 0.4490105 0.4378990 0.4103968 0.3794756
## [4,] 0.2526284 0.3482093 0.3956135 0.4253175 0.4751425 0.4587606 0.4390071
##      [,358]      [,359]      [,360]      [,361]      [,362]      [,363]      [,364]
## [1,] 0.2559998 0.1107404 0.1421875 0.1861016 0.3086725 0.3023456 0.3556261
## [2,] 0.6809901 0.6725839 0.6880088 0.7027361 0.7163737 0.7492095 0.7231999
## [3,] 0.3812519 0.3644166 0.4167271 0.4194682 0.4647322 0.4620735 0.4608227
## [4,] 0.3963503 0.4491866 0.5019493 0.4896550 0.4655476 0.4593846 0.4358743
##      [,365]      [,366]      [,367]      [,368]      [,369]      [,370]
##      [,371]
## [1,] 0.3791988 0.2039226 0.06532626 0.06400865 0.05787696 0.03829897
0.01433878
## [2,] 0.7189951 0.7406125 0.70649695 0.72289803 0.69929610 0.70827912
0.69537006
## [3,] 0.4872444 0.4710024 0.55080058 0.52246001 0.57759291 0.64928070
0.68695431
## [4,] 0.4522641 0.4786625 0.55632336 0.56498693 0.74479365 1.03083169
1.24165043
##      [,372]      [,373]      [,374]      [,375]      [,376]      [,377]
## [1,] 0.02118115 0.00829773 0.01182963 0.004605091 0.002718927 0.06213206
## [2,] 0.67051803 0.68825516 0.68258947 0.658116867 0.671696723 0.69106916
## [3,] 0.68583013 0.61799768 0.22591900 0.226827581 0.359000285 0.54837261
## [4,] 1.30836507 1.27645082 1.15286820 1.167339153 1.159381893 0.88953123
##      [,378]      [,379]      [,380]      [,381]      [,382]      [,383]
##      [,384]
## [1,] 0.06461051 0.0843308 0.1055858 0.1178514 0.1360860 0.1317531
0.1211288
## [2,] 0.65513093 0.6497085 0.6429436 0.6552449 0.6936505 0.7496992
0.7396027
## [3,] 0.56899892 0.6228519 0.5941325 0.6402874 0.6401589 0.6073160
0.5901214
## [4,] 0.98573955 1.1862160 1.2604157 1.1876535 0.9879084 0.4940466
0.2098661
##      [,385]      [,386]      [,387]      [,388]      [,389]      [,390]
##      [,391]
## [1,] 0.04681106 0.1022218 0.1148221 0.08904553 0.08406202 0.1392065
0.08406329
## [2,] 0.75417295 0.7219785 0.7228311 0.70412196 0.68159320 0.6754522
0.66728362
```

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## [3,] 0.59783048 0.6027368 0.6051777 0.61614238 0.61792471 0.5510195
0.47671079
## [4,] 0.19066718 0.1406027 0.1365636 0.19574680 0.25055427 0.2997912
0.35607569
##      [,392]      [,393]      [,394]      [,395]      [,396]      [,397]
[,398]
## [1,] 0.1434889 0.1374727 0.06390465 0.1100566 0.08426247 0.1903536
0.1465812
## [2,] 0.6705785 0.6778301 0.69009306 0.6797383 0.72271356 0.7149710
0.6823193
## [3,] 0.4373515 0.3665534 0.36744150 0.3722085 0.37257391 0.4031605
0.3804038
## [4,] 0.4352359 0.4772992 0.51422850 0.5134401 0.47692615 0.5460374
0.5022535
##      [,399]      [,400]      [,401]      [,402]      [,403]      [,404]
[,405]
## [1,] 0.08832849 0.03913507 0.1596854 0.1520441 0.2560435 0.3463938
0.3407685
## [2,] 0.71000526 0.72422986 0.6817733 0.6668681 0.6607545 0.6821758
0.6969413
## [3,] 0.39498366 0.36361586 0.4040718 0.4138061 0.4381153 0.4558437
0.4244999
## [4,] 0.45069623 0.45889371 0.2784879 0.3870051 0.4085329 0.4109128
0.4536517
##      [,406]      [,407]      [,408]      [,409]      [,410]      [,411]      [,412]
## [1,] 0.2614834 0.3485457 0.2879187 0.1930025 0.2325964 0.4562476 0.3091184
## [2,] 0.7115490 0.7110784 0.6876515 0.7091296 0.7375524 0.7183929 0.7458269
## [3,] 0.4120142 0.4021786 0.3963317 0.3663865 0.4185951 0.5180168 0.5051951
## [4,] 0.4524052 0.4079982 0.4305671 0.3985037 0.4674896 0.5395985 0.4767061
##      [,413]      [,414]      [,415]      [,416]      [,417]      [,418]
[,419]
## [1,] 0.2918090 0.3831290 0.2759807 0.1474641 0.01607827 0.03489568
0.0418509
## [2,] 0.7389626 0.7144867 0.7436316 0.7274743 0.70038802 0.68747700
0.7046249
## [3,] 0.5201170 0.5577264 0.5354213 0.6401860 0.73200641 0.70732779
0.7502938
## [4,] 0.4777512 0.4416326 0.3292608 0.8339192 1.20225197 1.13734913
1.2546337
##      [,420]      [,421]      [,422]      [,423]      [,424]      [,425]
## [1,] 0.02153036 0.0591521 0.02748802 0.01711414 0.01135235 0.002683286
## [2,] 0.69460602 0.6712664 0.66944916 0.66372169 0.66462436 0.639677840
## [3,] 0.75314347 0.7890706 0.79184547 0.78698765 0.47880780 0.324421889
## [4,] 1.31023114 1.2474632 1.23698924 1.24031910 1.20295040 1.162084698
##      [,426]      [,427]      [,428]      [,429]      [,430]      [,431]
## [1,] 0.001420963 0.06389137 0.07594425 0.05261366 0.09999933 0.08169238
## [2,] 0.671235819 0.65307429 0.64753126 0.65026129 0.66833893 0.68642992
## [3,] 0.609008854 0.65875011 0.66977784 0.70727008 0.69042303 0.72210773
## [4,] 1.236410360 1.34144943 1.34070575 1.28796634 1.19998677 1.28716628
##      [,432]      [,433]      [,434]      [,435]      [,436]      [,437]

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```
## [1,] 0.09928825 0.09664079 0.07338029 0.09841789 0.07467885 0.20224562
## [2,] 0.69307659 0.67803905 0.71541773 0.72513114 0.69169970 0.73335585
## [3,] 0.78654802 0.79368002 0.62854259 0.62371326 0.65470471 0.63667478
## [4,] 1.30144788 1.19405899 0.29367383 0.12727164 0.10869995 0.02724753
##      [,438]      [,439]      [,440]      [,441]      [,442]      [,443]
[ ,444]
## [1,] 0.07826774 0.1586273 0.1330591 0.00185409 0.1528300 0.09155009
0.006622881
## [2,] 0.69455773 0.7236569 0.6971461 0.71787686 0.6763969 0.67620032
0.675929120
## [3,] 0.61860738 0.5793095 0.5193088 0.42799514 0.3983818 0.38667922
0.352492315
## [4,] 0.20342491 0.2906325 0.2909874 0.28160565 0.4082402 0.50558018
0.502063197
##      [,445]      [,446]      [,447]      [,448]      [,449]      [,450]
[ ,451]
## [1,] 0.07438333 0.0528435 0.1818262 0.1213917 0.0893021 0.0804653
0.2120852
## [2,] 0.69152571 0.6989658 0.6665003 0.6902920 0.6876450 0.6747418
0.6519103
## [3,] 0.34398870 0.3503619 0.3812260 0.3579639 0.3265090 0.3081461
0.4527765
## [4,] 0.51506644 0.5299797 0.5062721 0.5040910 0.4009744 0.2717390
0.3526328
##      [,452]      [,453]      [,454]      [,455]      [,456]      [,457]      [,458]
## [1,] 0.2381112 0.3420841 0.3892091 0.4041756 0.1415158 0.2412379 0.2951774
## [2,] 0.6824907 0.6811060 0.6645367 0.6928148 0.7365452 0.7281705 0.7277889
## [3,] 0.4505777 0.4788692 0.4984125 0.4478801 0.3869349 0.4249425 0.4335394
## [4,] 0.3627265 0.3682368 0.3897141 0.4262135 0.3884680 0.3911787 0.4566873
##      [,459]      [,460]      [,461]      [,462]      [,463]      [,464]      [,465]
## [1,] 0.2729292 0.5076910 0.5913865 0.2649723 0.2483203 0.3110827 0.1584211
## [2,] 0.7420258 0.7684802 0.7673871 0.7538414 0.7319207 0.7564281 0.7460998
## [3,] 0.4700829 0.5300201 0.6182814 0.6179618 0.6044918 0.5978049 0.6530349
## [4,] 0.4357983 0.4416705 0.4867814 0.4981686 0.4409552 0.3799885 0.6717820
##      [,466]      [,467]      [,468]      [,469]      [,470]      [,471]
## [1,] 0.08044839 0.06971999 0.09947517 0.08896138 0.05551305 0.04201328
## [2,] 0.69997552 0.72486031 0.71919824 0.69577150 0.71430609 0.68911788
## [3,] 0.77251996 0.75698106 0.76787090 0.80194710 0.78804131 0.81639548
## [4,] 1.16722713 1.12075020 1.13513040 1.29229682 1.25481436 1.24634076
##      [,472]      [,473]      [,474]      [,475]      [,476]      [,477]
## [1,] 0.009331502 0.0454621 0.006536725 0.01851141 0.04676304 0.07707678
## [2,] 0.687917461 0.6793323 0.656630467 0.64694586 0.68563045 0.70529949
## [3,] 0.809809800 0.8210045 0.535290271 0.27034935 0.66795441 0.73811768
## [4,] 1.202604511 1.1267976 1.135763469 1.04373340 1.11964726 1.06166331
##      [,478]      [,479]      [,480]      [,481]      [,482]      [,483]
## [1,] 0.07697862 0.07160674 0.0734449 0.1159467 0.06464023 0.03047637
## [2,] 0.70284208 0.73672775 0.7311775 0.7211539 0.70741751 0.68543236
## [3,] 0.73427327 0.76315876 0.7982615 0.7771054 0.80215590 0.77874199
## [4,] 1.12097944 1.25680084 1.3519878 1.2431209 1.20875041 1.24840185
##      [,484]      [,485]      [,486]      [,487]      [,488]      [,489]
```

```
[,490]
## [1,] 0.008391862 0.1344449 0.08247196 0.1276665 0.1186859 0.1270818
0.08088894
## [2,] 0.719423648 0.7922795 0.82403883 0.8240164 0.7165148 0.7165925
0.68921352
## [3,] 0.689756409 0.5764490 0.60126011 0.5980900 0.6011234 0.5421274
0.47464729
## [4,] 0.853742412 0.2810177 0.34712294 0.3982881 0.3108886 0.3264476
0.26343149
##          [,491]      [,492]      [,493]      [,494]      [,495]      [,496]
[,497]
## [1,] 0.03207424 0.1102443 0.05573963 0.003815569 0.01797386 0.0202907
0.1639020
## [2,] 0.67248296 0.6996180 0.68926521 0.680898566 0.69668262 0.6746455
0.6629001
## [3,] 0.40843160 0.3676057 0.33704158 0.332473698 0.33296212 0.3258863
0.3464044
## [4,] 0.25194760 0.3182546 0.34994467 0.354612499 0.35092693 0.3747057
0.3301914
##          [,498]      [,499]      [,500]      [,501]      [,502]      [,503]
[,504]
## [1,] 0.1807791 0.1390063 0.07753491 0.2871651 0.2361822 0.2345391
0.3503279
## [2,] 0.6819837 0.6475540 0.66838543 0.7307251 0.7094954 0.7221191
0.7383402
## [3,] 0.2976633 0.3213645 0.33743866 0.5330712 0.5469173 0.5278138
0.5209615
## [4,] 0.2140669 0.1739687 0.20508890 0.4132925 0.4178532 0.4436036
0.4397774
##          [,505]      [,506]      [,507]      [,508]      [,509]      [,510]      [,511]
## [1,] 0.3633794 0.2777380 0.3069713 0.2431191 0.1636008 0.1658967 0.2148167
## [2,] 0.7443203 0.7684991 0.7591536 0.7682598 0.8112900 0.7859773 0.7826817
## [3,] 0.5026858 0.4975133 0.5109655 0.5445978 0.5760005 0.6120433 0.6669701
## [4,] 0.4156954 0.4396461 0.4488058 0.4465411 0.4466564 0.4325557 0.4189869
##          [,512]      [,513]      [,514]      [,515]      [,516]      [,517]      [,518]
## [1,] 0.1513324 0.1791439 0.1601925 0.1093526 0.1147286 0.1199324 0.1714073
## [2,] 0.7969203 0.7922596 0.7227337 0.7040992 0.7242190 0.7144220 0.7138281
## [3,] 0.6454242 0.6106312 0.7101002 0.7838046 0.7790017 0.7804193 0.8284744
## [4,] 0.3689109 0.3667360 0.9328354 1.3270079 1.1612554 1.0848774 1.2281075
##          [,519]      [,520]      [,521]      [,522]      [,523]      [,524]
[,525]
## [1,] 0.1490667 0.1178438 0.03507293 0.01336153 0.1134028 0.06609672
0.00849074
## [2,] 0.6925888 0.7351835 0.72005165 0.72565986 0.7368186 0.72727195
0.72704656
## [3,] 0.8529449 0.8309436 0.83878140 0.82196067 0.8816849 0.55535984
0.25321776
## [4,] 1.3057303 1.2212493 1.21587429 1.17853077 1.1818348 1.17886831
1.07268555
##          [,526]      [,527]      [,528]      [,529]      [,530]      [,531]
```

```
[,532]
## [1,] 0.04795663 0.05107567 0.04095859 0.08904718 0.1101882 0.1290111
0.04056687
## [2,] 0.74576887 0.71891897 0.72807118 0.72459780 0.6787664 0.7157759
0.72447692
## [3,] 0.71108136 0.85612752 0.80227619 0.77006321 0.7947307 0.7925936
0.76325182
## [4,] 1.08674562 1.11443856 1.03447222 1.02169492 1.0395442 1.1590795
1.14685819
##          [,533]      [,534]      [,535]      [,536]      [,537]      [,538]
[,539]
## [1,] 0.04249258 0.02603202 0.0872581 0.1019863 0.1018743 0.06320476
0.1227744
## [2,] 0.82461146 0.87692018 0.9280348 0.9032193 0.9840356 0.98791484
0.9664816
## [3,] 0.71750138 0.70375201 0.5799695 0.5630051 0.5062173 0.50336591
0.4572582
## [4,] 1.18366861 1.27584423 0.7196012 0.5007974 0.5360148 0.53682737
0.2749471
##          [,540]      [,541]      [,542]      [,543]      [,544]      [,545]
## [1,] 0.09088162 0.08931642 0.08398581 0.03323436 0.02344897 0.03213001
## [2,] 0.87053318 0.78545393 0.68950761 0.67579724 0.69439486 0.67354932
## [3,] 0.44287888 0.39638659 0.37576757 0.35069977 0.32860566 0.31596048
## [4,] 0.21585108 0.33725230 0.30866633 0.24654384 0.25706939 0.23337857
##          [,546]      [,547]      [,548]      [,549]      [,550]      [,551]
[,552]
## [1,] 0.01364261 0.1268997 0.1839394 0.1315366 0.08751655 0.2637197
0.2124902
## [2,] 0.65365263 0.6701231 0.6373667 0.6489991 0.63969559 0.7314007
0.7500164
## [3,] 0.32999478 0.3554771 0.3450746 0.3287341 0.34184821 0.6227762
0.6013945
## [4,] 0.27162187 0.3708287 0.3105346 0.2706497 0.31229627 0.4321366
0.4350864
##          [,553]      [,554]      [,555]      [,556]      [,557]      [,558]      [,559]
## [1,] 0.2357715 0.3698511 0.2842610 0.3047567 0.3107968 0.2006815 0.1118116
## [2,] 0.7450363 0.7696887 0.8049277 0.7840310 0.7737126 0.8036250 0.7658195
## [3,] 0.5940585 0.5769002 0.5786971 0.5816510 0.6089658 0.6117260 0.6527435
## [4,] 0.4344993 0.4687936 0.4116719 0.4523984 0.4482606 0.4070234 0.4242747
##          [,560]      [,561]      [,562]      [,563]      [,564]      [,565]
[,566]
## [1,] 0.1938692 0.1916064 0.1582789 0.1865660 0.1144537 0.05960682
0.08971217
## [2,] 0.7735679 0.7854511 0.7641440 0.7478903 0.7415586 0.72638258
0.69296261
## [3,] 0.6541058 0.6574272 0.6316168 0.7208896 0.8070121 0.78398291
0.78840614
## [4,] 0.3815588 0.3630760 0.3372375 0.8584766 1.3718853 1.24223319
1.22509365
##          [,567]      [,568]      [,569]      [,570]      [,571]      [,572]
```

```
[,573]
## [1,] 0.1039728 0.1489890 0.1101890 0.1389591 0.1133058 0.04296099
0.1110838
## [2,] 0.7025272 0.7435947 0.7512358 0.7604657 0.7356766 0.77350769
0.7787534
## [3,] 0.8254747 0.8581599 0.8820932 0.8898405 0.8774305 0.81576345
0.8494758
## [4,] 1.2574501 1.2784574 1.2328555 1.2331908 1.1844886 1.02107389
1.0592542
##          [,574]      [,575]      [,576]      [,577]      [,578]      [,579]
[,580]
## [1,] 0.00462808 0.01153621 0.02747284 0.08863124 0.0667786 0.1200335
0.1113804
## [2,] 0.78921747 0.72586506 0.77051985 0.79992184 0.8195674 0.7880073
0.8231327
## [3,] 0.48036239 0.27385765 0.73870122 0.89262374 0.7943183 0.8055263
0.7995024
## [4,] 1.05897553 1.23496177 1.25367704 1.17972042 1.0114298 1.1321294
1.2303392
##          [,581]      [,582]      [,583]      [,584]      [,585]      [,586]
[,587]
## [1,] 0.1600200 0.07443087 0.08080453 0.1316350 0.04302821 0.07790886
0.06845255
## [2,] 0.8824373 0.86117122 0.85359745 0.8098596 0.81733618 0.86315209
0.98077272
## [3,] 0.7416760 0.71853233 0.73539188 0.6929826 0.59371564 0.48702332
0.47921010
## [4,] 1.0863292 1.06456170 1.08631690 1.2360932 0.98143380 0.46764701
0.47155001
##          [,588]      [,589]      [,590]      [,591]      [,592]      [,593]
## [1,] 0.06105337 0.1166899 0.09321939 0.08501049 0.05257833 0.01211751
## [2,] 0.99141573 0.9871166 0.96739685 0.92147479 0.76812378 0.65394293
## [3,] 0.48109138 0.4424301 0.39520211 0.38104427 0.39334828 0.38349181
## [4,] 0.49425718 0.3249790 0.24905539 0.36267709 0.39351273 0.36061134
##          [,594]      [,595]      [,596]      [,597]      [,598]      [,599]
[,600]
## [1,] 0.01169744 0.02376935 0.007275073 0.1016599 0.2035574 0.1167569
0.1086538
## [2,] 0.66593704 0.66169453 0.666521009 0.6528321 0.6373012 0.6660145
0.6407696
## [3,] 0.37069092 0.35699384 0.361115335 0.4002720 0.3838844 0.3672401
0.3599516
## [4,] 0.38153207 0.41964856 0.391497993 0.4089267 0.4287988 0.4035284
0.3391185
##          [,601]      [,602]      [,603]      [,604]      [,605]      [,606]      [,607]
## [1,] 0.3242204 0.2579655 0.3060495 0.3756760 0.3447445 0.2200806 0.1868652
## [2,] 0.7615806 0.7585569 0.7570720 0.8022567 0.7962691 0.7969764 0.8123931
## [3,] 0.6574681 0.6501235 0.6377538 0.6240414 0.6428592 0.6357768 0.6172624
## [4,] 0.4808901 0.4445934 0.4029032 0.4075396 0.4233768 0.4431586 0.4321893
##          [,608]      [,609]      [,610]      [,611]      [,612]      [,613]
```

```

[,614]
## [1,] 0.1448778 0.07166668 0.09197184 0.0747051 0.04401616 0.09377886
0.1181267
## [2,] 0.8009400 0.81147958 0.79673009 0.8137898 0.79923398 0.76707856
0.7399606
## [3,] 0.6576086 0.62796363 0.63020605 0.5967879 0.67844877 0.77534392
0.7879415
## [4,] 0.4106468 0.40087606 0.39653968 0.3024809 0.75512675 1.27164530
1.2267573
##          [,615]          [,616]          [,617]          [,618]          [,619]          [,620]
[,621]
## [1,] 0.1095844 0.08763218 0.1322693 0.1513064 0.09606769 0.1740154
0.1690262
## [2,] 0.7440653 0.76013430 0.7742253 0.7819217 0.82559610 0.8527283
0.8640208
## [3,] 0.7778661 0.76832112 0.7725953 0.8182138 0.82177799 0.8471734
0.8177898
## [4,] 1.2361050 1.26189540 1.2063072 1.1917024 1.07224793 1.0270292
1.0080230
##          [,622]          [,623]          [,624]          [,625]          [,626]          [,627]
## [1,] 0.09065539 0.1686041 0.1316692 0.006197151 0.05529587 0.09311196
## [2,] 0.87665433 0.8222809 0.8662145 0.895629985 0.75342231 0.70586765
## [3,] 0.78820473 0.8290058 0.4063172 0.185689005 0.63792962 0.84277943
## [4,] 0.94450569 0.9152488 0.8669184 0.919049291 0.91697627 1.06340461
##          [,628]          [,629]          [,630]          [,631]          [,632]          [,633]
[,634]
## [1,] 0.07945617 0.1416676 0.1311733 0.1264969 0.1293002 0.09204824
0.1406717
## [2,] 0.79070720 0.8748253 0.8500520 0.8510033 0.7944312 0.78889377
0.7452121
## [3,] 0.79472891 0.7337560 0.7738445 0.7797515 0.7634514 0.73071689
0.6729552
## [4,] 1.02999280 0.7867288 1.3063745 1.3546733 1.1965331 1.13963946
1.1160042
##          [,635]          [,636]          [,637]          [,638]          [,639]          [,640]
## [1,] 0.09380701 0.07160789 0.05978837 0.1093838 0.08663768 0.06294221
## [2,] 0.73216684 0.79888773 0.84303554 0.8017272 0.76937825 0.81134108
## [3,] 0.64926770 0.53382415 0.48110473 0.5130130 0.46631341 0.36392468
## [4,] 1.14700977 0.53132202 0.39468982 0.4161298 0.39929449 0.14375153
##          [,641]          [,642]          [,643]          [,644]          [,645]          [,646]
## [1,] 0.05885282 0.04969578 0.01366661 0.01244035 0.001802313 0.002938476
## [2,] 0.88912398 0.88354189 0.76886305 0.65023410 0.645354247 0.662670834
## [3,] 0.39648826 0.39725368 0.39865997 0.43669261 0.438764227 0.407071841
## [4,] 0.34254761 0.36923035 0.35044095 0.39366556 0.440528494 0.415801903
##          [,647]          [,648]          [,649]          [,650]          [,651]          [,652]
[,653]
## [1,] 0.08335068 0.2049621 0.1415599 0.1161920 0.4093355 0.3439071
0.3298534
## [2,] 0.62893790 0.6672795 0.6622045 0.6505033 0.7908421 0.7722502
0.7870615

```



```
## [3,] 0.40070086 0.3917127 0.3716921 0.3600100 0.6552355 0.6699886
0.6670920
## [4,] 0.39238691 0.3735050 0.3961863 0.3910162 0.3605243 0.4336737
0.4552482
##      [,654]      [,655]      [,656]      [,657]      [,658]      [,659]      [,660]
## [1,] 0.3500373 0.2363904 0.1205110 0.1355741 0.1464022 0.1531484 0.2555988
## [2,] 0.8017187 0.8126239 0.8240431 0.8474201 0.8526779 0.8837740 0.8683382
## [3,] 0.6398243 0.6181550 0.6193037 0.6166070 0.6276318 0.6195113 0.6340866
## [4,] 0.4293844 0.3983440 0.4449415 0.4220165 0.3759367 0.4198982 0.3265987
##      [,661]      [,662]      [,663]      [,664]      [,665]      [,666]
##      [,667]
## [1,] 0.2785880 0.2592525 0.2381740 0.1142561 0.05045327 0.07182515
0.07756109
## [2,] 0.8615638 0.8364633 0.8187817 0.8181491 0.79713577 0.83379028
0.80556054
## [3,] 0.6830923 0.7591787 0.7383680 0.7098757 0.74290485 0.70812556
0.76383664
## [4,] 0.7668952 1.3017650 1.2068190 1.0908274 1.12520862 1.08227272
1.15451526
##      [,668]      [,669]      [,670]      [,671]      [,672]      [,673]
##      [,674]
## [1,] 0.07191798 0.07179147 0.1775379 0.1633160 0.08577866 0.1217390
0.1110507
## [2,] 0.82966149 0.84915849 0.8384161 0.8061645 0.77397557 0.7000674
0.7622966
## [3,] 0.79837871 0.82859678 0.8035939 0.8091603 0.76936314 0.7756552
0.3750726
## [4,] 1.23001512 1.29785719 1.1043834 0.9934908 0.90702812 0.7282686
0.7099100
##      [,675]      [,676]      [,677]      [,678]      [,679]      [,680]
##      [,681]
## [1,] 0.01646092 0.05705942 0.07619181 0.09801329 0.1235511 0.1327656
0.09662134
## [2,] 0.80889689 0.55908531 0.51097784 0.68492182 0.7808597 0.7719102
0.74837036
## [3,] 0.10893680 0.56053518 0.79553002 0.75478267 0.7918605 0.7614408
0.75214532
## [4,] 0.60648040 0.63198770 0.78868301 1.13503315 1.3139187 1.2329733
1.21118604
##      [,682]      [,683]      [,684]      [,685]      [,686]      [,687]
##      [,688]
## [1,] 0.1039360 0.09758938 0.06234108 0.04542642 0.0638812 0.04298916
0.06834872
## [2,] 0.7448351 0.78736519 0.79240916 0.81516434 0.8540315 0.87149371
0.88243069
## [3,] 0.7475940 0.71485663 0.65917823 0.67323244 0.5962948 0.47989272
0.47058475
## [4,] 1.2931307 1.35927987 1.09013111 1.15754821 0.7651392 0.29753743
0.38896436
##      [,689]      [,690]      [,691]      [,692]      [,693]      [,694]
```

```
[,695]
## [1,] 0.07951643 0.0344379 0.02661842 0.0198727 0.04093424 0.04517419
0.03798366
## [2,] 0.87605926 0.8812504 0.84073665 0.9102561 0.87868150 0.81484222
0.68507424
## [3,] 0.45388531 0.4302377 0.43675925 0.4335337 0.46114091 0.48409601
0.46796614
## [4,] 0.29964235 0.2166905 0.39944041 0.4028919 0.41863509 0.37218362
0.37755925
##           [,696]      [,697]      [,698]      [,699]      [,700]      [,701]
[,702]
## [1,] 0.01040536 0.05865576 0.2340379 0.1740619 0.1064224 0.2154980
0.2747448
## [2,] 0.63391634 0.63969715 0.6473343 0.6621967 0.6538096 0.7680350
0.7689457
## [3,] 0.46155647 0.43046977 0.4338114 0.4290789 0.4764263 0.5612930
0.5888930
## [4,] 0.43772370 0.46144780 0.4222905 0.3668355 0.4296724 0.2155841
0.3159626
##           [,703]      [,704]      [,705]      [,706]      [,707]      [,708]      [,709]
## [1,] 0.2641359 0.2203237 0.1885304 0.3663053 0.6229326 0.7591897 0.8993445
## [2,] 0.7965361 0.7930396 0.8361049 0.8536259 0.8662766 0.8637513 0.8368472
## [3,] 0.6100066 0.6071780 0.5522310 0.5804306 0.6431569 0.6661268 0.6519728
## [4,] 0.4045232 0.4165368 0.3610216 0.4315576 0.4352964 0.4096823 0.3387775
##           [,710]      [,711]      [,712]      [,713]      [,714]      [,715]      [,716]
## [1,] 0.9425578 0.9305541 0.8544156 0.7619048 0.7443097 0.6380542 0.4374034
## [2,] 0.8190850 0.7831048 0.7902425 0.7919216 0.7884045 0.7817711 0.6896840
## [3,] 0.7188935 0.8132960 0.7740314 0.7532198 0.7914442 0.7947990 0.7933414
## [4,] 0.5933451 1.3087345 1.2252369 1.1343217 1.2549660 1.2266496 1.2437769
##           [,717]      [,718]      [,719]      [,720]      [,721]      [,722]
[,723]
## [1,] 0.2597142 0.1134281 0.06322224 0.06702794 0.02871642 0.06130723
0.07772437
## [2,] 0.6380742 0.6866622 0.65470163 0.51216396 0.48283772 0.55566873
0.58917313
## [3,] 0.7716413 0.7462917 0.76697638 0.76419703 0.78250412 0.75606482
0.69538388
## [4,] 1.1893735 1.0628998 1.10040446 1.12153409 1.15241630 1.08849643
0.79708161
##           [,724]      [,725]      [,726]      [,727]      [,728]      [,729]
## [1,] 0.009857066 0.008995287 0.02241496 0.02503609 0.1084677 0.1374300
## [2,] 0.765899965 0.780390741 0.80494402 0.77288113 0.8274922 0.8527550
## [3,] 0.328339980 0.080256616 0.50124655 0.79056590 0.7168066 0.7763516
## [4,] 0.626072751 0.576819833 0.64722267 1.07263247 0.9447518 1.3116938
##           [,730]      [,731]      [,732]      [,733]      [,734]      [,735]
[,736]
## [1,] 0.1202482 0.08653584 0.1103719 0.1379748 0.04956684 0.01532138
0.08055391
## [2,] 0.8564836 0.84945566 0.8671299 0.8514075 0.80626490 0.81405559
0.85417267
```

```
## [3,] 0.7795076 0.74339658 0.7436844 0.7333326 0.68283757 0.65492378
0.63869510
## [4,] 1.4126500 1.19006365 1.3043691 1.3829731 1.22675316 1.12384256
1.05885634
##      [,737]      [,738]      [,739]      [,740]      [,741]      [,742]
[,743]
## [1,] 0.1498690 0.1250055 0.09798442 0.09531555 0.04872565 0.02831005
0.02752767
## [2,] 0.8817459 0.8613565 0.90751343 0.92342933 0.95130654 0.92084972
0.94667488
## [3,] 0.5141328 0.5199695 0.49905553 0.43506504 0.48056944 0.49598104
0.47558147
## [4,] 0.3875458 0.3518620 0.22907429 0.11179996 0.36883136 0.42600220
0.44770483
##      [,744]      [,745]      [,746]      [,747]      [,748]      [,749]
[,750]
## [1,] 0.05091862 0.04259805 0.009199228 0.07452755 0.2811944 0.2102767
0.1781072
## [2,] 0.97799893 0.80349532 0.732565015 0.68499590 0.6788479 0.6775053
0.6597435
## [3,] 0.48173365 0.50166308 0.474744181 0.50397215 0.5122723 0.5715160
0.6233908
## [4,] 0.40356921 0.35941886 0.364850428 0.42030449 0.4611164 0.4008544
0.4333750
##      [,751]      [,752]      [,753]      [,754]      [,755]      [,756]      [,757]
## [1,] 0.2221041 0.2272901 0.1447989 0.1942705 0.6209776 0.8510208 0.8623037
## [2,] 0.7566156 0.8066153 0.8165379 0.7939923 0.7999849 0.8172610 0.8008530
## [3,] 0.4901145 0.4675913 0.5015734 0.5393184 0.5543647 0.5569138 0.5842704
## [4,] 0.1340788 0.1120567 0.1824151 0.3402351 0.3773544 0.3587869 0.3601500
##      [,758]      [,759]      [,760]      [,761]      [,762]      [,763]      [,764]
## [1,] 0.7605854 0.6861436 0.6517406 0.6412492 0.7704870 0.8766079 0.8136359
## [2,] 0.7708215 0.8436853 0.6152062 0.6157726 0.7724774 0.7492920 0.6276443
## [3,] 0.5556000 0.5543535 0.7221596 0.7582281 0.7468924 0.7594014 0.8015124
## [4,] 0.3712723 0.3585645 0.9907559 1.2201784 1.1049398 1.2207236 1.2402940
##      [,765]      [,766]      [,767]      [,768]      [,769]      [,770]      [,771]
## [1,] 0.8152483 0.9241600 0.8791919 0.6728395 0.5791736 0.4760193 0.2761363
## [2,] 0.5770835 0.5029493 0.4739292 0.5280426 0.4947272 0.3491595 0.5284928
## [3,] 0.7762805 0.7810860 0.7776259 0.7266659 0.7169122 0.7208082 0.7278160
## [4,] 1.0835112 1.1178990 1.1122429 0.9359672 0.8811197 0.9267295 1.0388880
##      [,772]      [,773]      [,774]      [,775]      [,776]      [,777]      [,778]
## [1,] 0.2684974 0.2208420 0.1727685 0.1863971 0.3295529 0.3493483 0.5128071
## [2,] 0.7551031 0.7013775 0.7119417 0.8063844 0.8387429 0.7807019 0.7679065
## [3,] 0.7289563 0.7396899 0.3657808 0.1447896 0.4918033 0.7273335 0.7510098
## [4,] 1.2071419 1.1686939 0.9266267 0.7044867 0.7912920 0.9815327 1.0997340
##      [,779]      [,780]      [,781]      [,782]      [,783]      [,784]      [,785]
## [1,] 0.5063231 0.3821487 0.1946101 0.1506896 0.1479115 0.1561147 0.1597107
## [2,] 0.8381378 0.7836454 0.7837146 0.8103995 0.8198830 0.8566714 0.9410015
## [3,] 0.7583783 0.7822188 0.7665702 0.7406102 0.7435125 0.6976614 0.6668815
## [4,] 1.1600940 1.4245624 1.3951349 1.3537168 1.3841039 1.2065413 1.0967244
##      [,786]      [,787]      [,788]      [,789]      [,790]      [,791]
```

```

[,792]
## [1,] 0.1282859 0.2820625 0.3624514 0.2033563 0.20831996 0.2143413
0.1474870
## [2,] 0.9528900 0.9576643 1.0092060 1.0289651 1.00391286 1.0145116
0.9847268
## [3,] 0.6783648 0.5898877 0.5471576 0.5314537 0.48527576 0.4892563
0.4934944
## [4,] 1.1214733 0.5962583 0.2809691 0.2015797 0.06896575 0.3342944
0.4818623
##          [,793]      [,794]      [,795]      [,796]      [,797]      [,798]
[,799]
## [1,] 0.1592136 0.1442024 0.09183654 0.02119233 0.07295352 0.2775754
0.2107749
## [2,] 0.9043672 0.9579719 0.94699549 0.85753546 0.68602808 0.6861629
0.6903035
## [3,] 0.4780953 0.4836681 0.48893459 0.50858463 0.57445494 0.6514466
0.6513613
## [4,] 0.4750792 0.4974042 0.48146048 0.34456300 0.38648919 0.4723875
0.4267073
##          [,800]      [,801]      [,802]      [,803]      [,804]      [,805]
[,806]
## [1,] 0.2052353 0.20390900 0.15197093 0.08566311 0.5009790 1.0055633
0.9425554
## [2,] 0.6799169 0.78348128 0.77352242 0.76585388 0.7817782 0.8130266
0.5695059
## [3,] 0.6336570 0.38505163 0.38835258 0.40237242 0.4486199 0.5108206
0.4959781
## [4,] 0.4102117 0.09825994 0.09344925 0.18111201 0.2622575 0.3137730
0.1609240
##          [,807]      [,808]      [,809]      [,810]      [,811]      [,812]      [,813]
## [1,] 0.9251720 0.8501140 0.7150159 0.5799255 0.5211333 0.4831500 0.6110260
## [2,] 0.5682990 0.8039418 0.8197731 0.6120016 0.5852013 0.4810062 0.4444854
## [3,] 0.4824808 0.5721605 0.6432451 0.6586332 0.6864443 0.7002494 0.7494524
## [4,] 0.1431226 0.9624696 1.2113907 1.1768434 1.0547163 1.0085570 1.1659243
##          [,814]      [,815]      [,816]      [,817]      [,818]      [,819]      [,820]
## [1,] 0.7306316 0.6900982 0.6179531 0.8260862 0.9870072 0.8739811 0.8568294
## [2,] 0.5727696 0.5655093 0.6116395 0.6815009 0.6436019 0.7397409 0.6601379
## [3,] 0.7049362 0.7578915 0.7119921 0.7251734 0.7314683 0.7199456 0.6570904
## [4,] 0.9868960 1.2121233 1.1520462 1.1539990 1.0408465 1.0382421 0.8590347
##          [,821]      [,822]      [,823]      [,824]      [,825]      [,826]      [,827]
## [1,] 0.8582754 0.7324428 0.8118978 0.7450454 0.7132196 0.9355152 0.7466274
## [2,] 0.7273315 0.7201643 0.7291565 0.7762748 0.7875470 0.7797610 0.7676021
## [3,] 0.6709508 0.6886552 0.7193927 0.3970640 0.1916126 0.5642193 0.7287038
## [4,] 0.8014554 0.8464998 1.0245481 1.0995073 0.8999920 0.9122031 0.8963527
##          [,828]      [,829]      [,830]      [,831]      [,832]      [,833]
[,834]
## [1,] 0.9028777 0.6511913 0.6687099 0.4333631 0.1494962 0.1472822
0.07362209
## [2,] 0.7518828 0.7369556 0.7916135 0.7495853 0.7721254 0.7943005
0.75597880

```

```

## [3,] 0.7667567 0.7362767 0.7906509 0.8106083 0.7670784 0.7653811
0.76255839
## [4,] 1.0976311 1.1169410 1.4021350 1.4906438 1.3958701 1.3354445
1.25991661
##      [,835]      [,836]      [,837]      [,838]      [,839]      [,840]      [,841]
## [1,] 0.1299507 0.2276974 0.3119282 0.5298762 0.3704564 0.3569786 0.3915581
## [2,] 0.8425913 0.8205244 0.8665396 0.8050744 0.8130100 0.7776400 0.7594644
## [3,] 0.7340369 0.7285576 0.6653005 0.5883464 0.5888620 0.5499844 0.5319303
## [4,] 1.1801876 1.1288059 0.8519693 0.2758893 0.2197144 0.1183372 0.1814725
##      [,842]      [,843]      [,844]      [,845]      [,846]      [,847]      [,848]
## [1,] 0.3641759 0.4032474 0.4668025 0.4583294 0.2682786 0.2915962 0.4364491
## [2,] 0.7466047 0.7629471 0.8142124 0.9106989 0.8655596 0.6999342 0.6906479
## [3,] 0.5417954 0.5791120 0.5864781 0.5885627 0.6323559 0.6759564 0.6928790
## [4,] 0.3953797 0.5406004 0.5405210 0.5420369 0.5161638 0.4048335 0.4560457
##      [,849]      [,850]      [,851]      [,852]      [,853]      [,854]      [,855]
## [1,] 0.3871397 0.3523684 0.9078643 0.9122745 0.8429546 0.6615592 0.4371612
## [2,] 0.7077701 0.7061398 0.5992233 0.7036833 0.7067534 0.5472896 0.6185415
## [3,] 0.7007388 0.6979411 0.4572250 0.4694853 0.4993714 0.5204970 0.4765307
## [4,] 0.5010643 0.4481234 0.1481201 0.2986358 0.5033063 0.4432892 0.3775881
##      [,856]      [,857]      [,858]      [,859]      [,860]      [,861]      [,862]
## [1,] 0.3931019 0.4286269 0.5509775 0.5305274 0.6073821 0.5493615 0.4034335
## [2,] 0.6517077 0.7583006 0.8277117 0.7323372 0.6421238 0.6060447 0.4352098
## [3,] 0.4430828 0.4202377 0.4823379 0.6244708 0.6367327 0.6332564 0.6170614
## [4,] 0.2827848 0.1716678 0.6287385 1.2047655 1.1322985 1.0398738 0.9984347
##      [,863]      [,864]      [,865]      [,866]      [,867]      [,868]      [,869]
## [1,] 0.2739815 0.1571633 0.4591846 0.6319279 0.4891845 0.5176957 0.9618960
## [2,] 0.4052880 0.5080032 0.4957994 0.6028818 0.7579117 0.7895504 0.7541328
## [3,] 0.6433649 0.6109093 0.6609923 0.6272993 0.6531847 0.6383793 0.6691563
## [4,] 1.1447369 1.1050870 1.0707618 1.0996299 1.3289109 1.2558672 1.1278889
##      [,870]      [,871]      [,872]      [,873]      [,874]      [,875]      [,876]
## [1,] 0.7254416 0.7359133 0.9009625 0.5349985 0.9135086 0.5001502 0.9083103
## [2,] 0.7099132 0.7516636 0.7340312 0.7499590 0.7705414 0.8181322 0.8374868
## [3,] 0.6072912 0.6294805 0.6610955 0.6302228 0.3354320 0.1800416 0.4959673
## [4,] 0.8285024 0.8046273 0.8242592 0.6996419 0.8310211 0.8976408 0.8694377
##      [,877]      [,878]      [,879]      [,880]      [,881]      [,882]      [,883]
## [1,] 0.6533271 0.9103984 0.6095769 0.8222295 0.6043005 0.5435087 0.1782695
## [2,] 0.9012735 0.8708385 0.8733537 0.8441201 0.8386271 0.8630987 0.8543959
## [3,] 0.7244631 0.7728128 0.7008730 0.7835374 0.8173628 0.7918014 0.7691830
## [4,] 1.1206087 1.2982101 1.1112679 1.4387209 1.5183554 1.4327470 1.3376832
##      [,884]      [,885]      [,886]      [,887]      [,888]      [,889]
##      [,890]
## [1,] 0.07922344 0.1038499 0.1900907 0.2261795 0.4067321 0.3890635
0.3661464
## [2,] 0.80887422 0.7695641 0.8889858 0.8900522 0.7154143 0.7343789
0.7656337
## [3,] 0.76537146 0.7591757 0.7159845 0.7025275 0.7349328 0.6408943
0.6091733
## [4,] 1.29865774 1.2319527 1.1636221 1.0274882 0.8235390 0.3679446
0.1953251
##      [,891]      [,892]      [,893]      [,894]      [,895]      [,896]      [,897]

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```

## [1,] 0.3748759 0.3107708 0.4319893 0.4568998 0.6845934 0.8892571 0.8901677
## [2,] 0.7629796 0.7679981 0.7196204 0.6965049 0.7355111 0.7828780 0.6991831
## [3,] 0.5720960 0.5670224 0.5994667 0.6270641 0.6868700 0.7259908 0.7464295
## [4,] 0.1275811 0.2363040 0.3996167 0.5291149 0.6242778 0.6139348 0.5080067
##      [,898]      [,899]      [,900]      [,901]      [,902]      [,903]      [,904]
## [1,] 1.1437159 1.0486882 1.0686748 1.3789938 1.4190750 1.2849673 0.9285284
## [2,] 0.6917969 0.6928248 0.7000801 0.4261545 0.4383656 0.4378255 0.2452278
## [3,] 0.7431290 0.7477940 0.7396130 0.5464597 0.5982586 0.6077819 0.5906709
## [4,] 0.5565309 0.5619592 0.5946649 0.2414244 0.5070072 0.5762038 0.4728490
##      [,905]      [,906]      [,907]      [,908]      [,909]      [,910]
##      [,911]
## [1,] 0.7484745 0.7204907 0.5415533 0.3632537 0.1135146 0.03032333
0.2517773
## [2,] 0.3612283 0.8611943 0.8298474 0.7095726 0.6216890 0.62328167
0.5123576
## [3,] 0.5495871 0.5132457 0.4685203 0.4618956 0.5254183 0.54951824
0.5563626
## [4,] 0.4440133 0.4664030 0.4230266 0.3547495 0.9149198 1.04937818
0.8885490
##      [,912]      [,913]      [,914]      [,915]      [,916]      [,917]      [,918]
## [1,] 0.3760768 0.3369966 0.2501336 0.2355962 0.6584729 0.7346212 0.3073438
## [2,] 0.5171113 0.5530721 0.5443301 0.6177949 0.6668908 0.7029108 0.7536563
## [3,] 0.5758750 0.5956014 0.6028462 0.5446188 0.5660165 0.5867362 0.5500367
## [4,] 1.0702282 1.1678445 1.2912580 0.9087786 0.9990188 1.1528093 1.1275635
##      [,919]      [,920]      [,921]      [,922]      [,923]      [,924]      [,925]
## [1,] 0.6432603 0.9100389 0.5110529 0.9230239 0.5726132 0.7835285 0.6105622
## [2,] 0.7383725 0.7271884 0.7859612 0.7943025 0.8226402 0.8185313 0.8444216
## [3,] 0.6395113 0.6473843 0.5987170 0.6166290 0.5480323 0.2850076 0.1884203
## [4,] 1.2897374 1.2208142 1.0044562 0.8392658 0.7299923 0.7253293 0.6935241
##      [,926]      [,927]      [,928]      [,929]      [,930]      [,931]      [,932]
## [1,] 0.8349179 0.6356601 0.8341593 0.6096440 0.5940478 0.4395811 0.5893266
## [2,] 0.7762640 0.7821838 0.7866424 0.7415979 0.6520233 0.7025552 0.7479908
## [3,] 0.4808081 0.7684185 0.7632758 0.7113515 0.8117251 0.7831936 0.7926033
## [4,] 0.9057775 1.2530392 1.3019173 1.1114510 1.3947259 1.4411095 1.3837807
##      [,933]      [,934]      [,935]      [,936]      [,937]      [,938]      [,939]
## [1,] 0.4621161 0.3248766 0.2038446 0.2861241 0.2257492 0.3678182 0.3537404
## [2,] 0.7484621 0.7269483 0.7668782 0.8140079 0.8669770 0.7270701 0.7193844
## [3,] 0.7918442 0.7932180 0.7620657 0.7712801 0.7457817 0.7604629 0.5950724
## [4,] 1.3368015 1.3042848 1.2517641 1.2530198 1.1822010 0.9776966 0.2548352
##      [,940]      [,941]      [,942]      [,943]      [,944]      [,945]      [,946]
## [1,] 0.4114609 0.4120834 0.4283844 0.5161245 0.6616412 0.8541277 1.0299525
## [2,] 0.8176688 0.7956778 0.8272238 0.8313636 0.8624541 0.8327618 0.7778030
## [3,] 0.5381685 0.5187864 0.5143378 0.4936525 0.5304434 0.6201731 0.6815363
## [4,] 0.1934272 0.1619800 0.2815338 0.2831241 0.2852114 0.5017199 0.6438162
##      [,947]      [,948]      [,949]      [,950]      [,951]      [,952]      [,953]
## [1,] 1.1340505 1.1407890 0.7752275 1.3083892 1.3190803 1.3558991 1.1341524
## [2,] 0.6729793 0.7562598 0.7482242 0.7186019 0.5149499 0.3457015 0.3840222
## [3,] 0.7142288 0.6647928 0.6197923 0.6952752 0.5916444 0.6377877 0.6230487
## [4,] 0.5850329 0.5195701 0.4560815 0.6298379 0.3457729 0.5466885 0.4895502
##      [,954]      [,955]      [,956]      [,957]      [,958]      [,959]      [,960]

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## [1,] 0.9142628 0.6617844 0.4936729 0.4347027 0.4370725 0.3939006 0.3050471
## [2,] 0.6645395 0.5702684 0.7267562 0.6998812 0.8174088 0.6958107 0.6982794
## [3,] 0.6017505 0.6016267 0.5796105 0.5522411 0.5163333 0.5939565 0.6614501
## [4,] 0.4350546 0.4286134 0.3921436 0.4249991 0.2839573 0.7301458 1.0511307
##      [,961]      [,962]      [,963]      [,964]      [,965]      [,966]      [,967]
## [1,] 0.1038474 0.1134268 0.4663668 0.5185416 0.4264986 0.4074884 0.8940847
## [2,] 0.6283182 0.7283677 0.7889632 0.7374095 0.7505861 0.7560121 0.6751454
## [3,] 0.6117733 0.6441587 0.6316254 0.6498467 0.6169113 0.6158789 0.6368903
## [4,] 0.9102536 1.1240872 1.0425185 1.2129844 1.2111715 1.2524392 1.2346073
##      [,968]      [,969]      [,970]      [,971]      [,972]      [,973]      [,974]
## [1,] 0.4871821 0.3222116 1.0153300 0.5578693 0.5980690 0.7929041 0.5972799
## [2,] 0.7849081 0.8098923 0.7667469 0.7556450 0.7759897 0.8577606 0.8065536
## [3,] 0.5827445 0.5755305 0.6559279 0.6322729 0.6235396 0.5472513 0.2616238
## [4,] 1.0440266 1.1148033 1.3188320 1.2839664 1.1530008 0.9491817 0.6936802
##      [,975]      [,976]      [,977]      [,978]      [,979]      [,980]      [,981]
## [1,] 0.4402898 0.6995591 0.5869327 0.6470513 0.6018215 0.4243987 0.4863629
## [2,] 0.7466090 0.7548224 0.7422259 0.7434754 0.6483657 0.6491880 0.4532918
## [3,] 0.1350852 0.4088776 0.6370946 0.6105035 0.6645581 0.7074116 0.7213075
## [4,] 0.7635715 1.0278060 1.0779636 1.0352483 1.1184496 1.3176988 1.3460231
##      [,982]      [,983]      [,984]      [,985]      [,986]      [,987]      [,988]
## [1,] 0.4869163 0.5885637 0.5528163 0.3914948 0.4429116 0.2417146 0.3893937
## [2,] 0.2340104 0.3347536 0.7092039 0.8960030 0.6144772 0.7005745 0.7722556
## [3,] 0.7871366 0.7745330 0.7745819 0.7505445 0.7509566 0.7213725 0.6809220
## [4,] 1.3458256 1.2868662 1.2903589 1.2695369 1.2644250 1.2344645 0.9963041
##      [,989]      [,990]      [,991]      [,992]      [,993]      [,994]
##      [,995]
## [1,] 0.4277343 0.6028984 0.64034961 0.8013003 0.8881797 0.9196178
0.8497016
## [2,] 0.8166218 0.7442322 0.87245167 0.9332597 0.8843405 0.8666938
0.8394877
## [3,] 0.5274604 0.5061858 0.43347177 0.4599844 0.4748578 0.4847898
0.4779859
## [4,] 0.2621578 0.0829457 0.08347267 0.1698905 0.2135555 0.2325207
0.1811807
##      [,996]      [,997]      [,998]      [,999]      [,1000]      [,1001]      [,1002]
## [1,] 0.7651497 0.9428462 0.8346790 1.1568777 1.3148855 1.3492622 1.4693059
## [2,] 0.8831181 0.8212200 0.7815040 0.7638669 0.7735782 0.7223511 0.6213521
## [3,] 0.5170540 0.5899703 0.5778489 0.5984535 0.6146374 0.5510161 0.5891265
## [4,] 0.2930393 0.5379707 0.5908727 0.5438020 0.5333017 0.4464256 0.4815287
##      [,1003]      [,1004]      [,1005]      [,1006]      [,1007]      [,1008]      [,1009]
## [1,] 1.0035783 0.3758904 0.5498899 0.5282675 0.4437281 0.4437881 0.4348395
## [2,] 0.6837920 0.7846535 0.7173512 0.8187534 0.7467133 0.8357849 0.8509955
## [3,] 0.5508592 0.5178266 0.5716902 0.5746415 0.5704541 0.5540541 0.5890467
## [4,] 0.4322244 0.3505500 0.4055195 0.3614116 0.3518159 0.3649750 0.5894766
##      [,1010]      [,1011]      [,1012]      [,1013]      [,1014]      [,1015]      [,1016]
## [1,] 0.3639583 0.2971361 0.1724256 0.2481699 0.5491999 0.5860725 0.2493586
## [2,] 0.8258580 0.8330171 0.7971108 0.7875543 0.8241960 0.7777268 0.8424427
## [3,] 0.6547015 0.6569473 0.6091181 0.6243813 0.6544718 0.6716599 0.6206508
## [4,] 1.0493195 1.1053312 0.9456388 1.0212476 1.1378952 1.2868310 1.1890331
##      [,1017]      [,1018]      [,1019]      [,1020]      [,1021]      [,1022]      [,1023]

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## [1,] 0.5773624 0.8063779 0.2498171 0.6095737 0.8569915 0.3316127 0.5999666
## [2,] 0.7799321 0.8612011 0.9464923 0.8683035 0.8551881 0.8806277 0.9474974
## [3,] 0.6446761 0.6775290 0.5591327 0.6159866 0.6602273 0.6066038 0.5759465
## [4,] 1.2217279 1.1928401 0.9546789 1.0872716 1.1919164 1.0379706 0.9258682
##      [,1024]  [,1025]  [,1026]  [,1027]  [,1028]  [,1029]  [,1030]
## [1,] 0.6392386 0.1734015 0.6658328 0.4266553 0.6179619 0.4616213 0.4704550
## [2,] 0.9163488 0.8822309 0.9309877 0.9310871 0.9663274 0.9215638 0.9438637
## [3,] 0.3014133 0.1783853 0.4274509 0.5663387 0.5556550 0.6107454 0.6316401
## [4,] 0.7317139 0.7714996 1.0686235 0.8847818 0.8523381 1.0927136 1.2701617
##      [,1031]  [,1032]  [,1033]  [,1034]  [,1035]  [,1036]  [,1037]
## [1,] 0.5074148 0.4616468 0.4471249 0.5781396 0.5511776 0.6468136 0.4403320
## [2,] 0.7292042 0.5791571 0.5119751 0.7257071 0.8614112 0.6933690 0.6750573
## [3,] 0.6770202 0.7104059 0.7246746 0.7136580 0.7234729 0.7245353 0.7318574
## [4,] 1.3038178 1.3447629 1.3159191 1.2903392 1.3349893 1.2756529 1.2925968
##      [,1038]  [,1039]  [,1040]  [,1041]  [,1042]  [,1043]
##      [,1044]
## [1,] 0.5164130 0.7014259 0.56866327 0.74582793 0.62917833 0.51842113
0.46649171
## [2,] 0.6487395 0.7910377 0.79743235 0.86172687 0.92947082 0.96020971
0.95758617
## [3,] 0.7041851 0.5771369 0.52863629 0.47087155 0.45652084 0.43142299
0.42892447
## [4,] 1.1146392 0.3202762 0.09059443 0.05270831 0.07024326 0.03199556
0.05590353
##      [,1045]  [,1046]  [,1047]  [,1048]  [,1049]  [,1050]
##      [,1051]
## [1,] 0.49306427 0.55021601 1.0884230 1.1858217 1.2171498 1.3087924
1.3770194
## [2,] 0.82845066 0.90186033 0.8952754 0.8275248 0.7653953 0.7685793
0.6671966
## [3,] 0.42235767 0.40368037 0.4886394 0.5352817 0.5574654 0.6047473
0.5355820
## [4,] 0.07551023 0.02942234 0.1766488 0.2923632 0.4543752 0.5620872
0.4943121
##      [,1052]  [,1053]  [,1054]  [,1055]  [,1056]  [,1057]  [,1058]
## [1,] 1.3966205 0.9238870 0.5837821 0.2881313 0.1762983 0.2042452 0.1940510
## [2,] 0.7810358 0.9043121 0.9095074 0.8750081 0.8307815 0.6103870 0.7615200
## [3,] 0.5212377 0.4973847 0.4815775 0.4508201 0.4529739 0.4756119 0.4517053
## [4,] 0.4699302 0.4317736 0.3729334 0.3393035 0.3462213 0.3226772 0.3317059
##      [,1059]  [,1060]  [,1061]  [,1062]  [,1063]  [,1064]  [,1065]
## [1,] 0.2941797 0.3344377 0.3448074 0.3523877 0.1675334 0.3315712 0.6619373
## [2,] 0.9187484 0.9341949 0.8673890 0.8479532 0.8696875 0.9174734 0.8741348
## [3,] 0.4414590 0.5589140 0.5673288 0.5383765 0.5483612 0.5440651 0.6089444
## [4,] 0.3781991 1.0022848 1.0541715 0.8423455 1.0473427 0.9184359 1.1615568
##      [,1066]  [,1067]  [,1068]  [,1069]  [,1070]  [,1071]  [,1072]
## [1,] 0.4403704 0.1361707 0.7829823 0.3175969 0.1030872 0.7539476 0.2832977
## [2,] 0.9086570 0.8713360 0.8244702 0.8481836 0.7268548 0.8240038 0.8759710
## [3,] 0.5876578 0.5636914 0.6543183 0.6131441 0.6554501 0.7142232 0.6660250
## [4,] 1.2039857 1.1967011 1.2765366 1.2718866 1.3833783 1.3686869 1.0718551
##      [,1073]  [,1074]  [,1075]  [,1076]  [,1077]  [,1078]

```



```
[,1079]
## [1,] 0.2935502 0.6004942 0.08571599 0.6266269 0.1942601 0.6301442
0.2449104
## [2,] 0.8904582 0.9214985 0.93656205 0.9084656 0.9412800 1.0152693
0.9793240
## [3,] 0.6263041 0.3552624 0.18472244 0.4447009 0.5880544 0.5607425
0.5986266
## [4,] 1.1689573 0.9944274 0.80660160 1.0395233 0.9026855 0.8198527
1.0909545
##      [,1080]  [,1081]  [,1082]  [,1083]  [,1084]  [,1085]  [,1086]
## [1,] 0.5818091 0.3155504 0.5311198 0.4733477 0.4815282 0.5105509 0.6130547
## [2,] 0.8005416 0.6346935 0.6484977 0.8046914 0.7521631 0.7946571 0.6505282
## [3,] 0.6660152 0.6799657 0.7215973 0.6917565 0.6919014 0.7082596 0.7401883
## [4,] 1.3263639 1.2620341 1.3965363 1.3426890 1.2781542 1.2586713 1.3090220
##      [,1087]  [,1088]  [,1089]  [,1090]  [,1091]  [,1092]
[,1093]
## [1,] 0.5058878 0.5234469 0.9376727 0.54122071 0.61226480 0.31569559
0.195380303
## [2,] 0.5454307 0.6660492 0.8168839 0.86596977 0.82747045 0.85573889
0.659984553
## [3,] 0.7576430 0.7310274 0.5939504 0.51802562 0.51700921 0.47791565
0.467222387
## [4,] 1.2223200 1.1227000 0.2532373 0.05222848 0.08297286 0.04550515
0.008769104
##      [,1094]  [,1095]  [,1096]  [,1097]  [,1098]  [,1099]
[,1100]
## [1,] 0.217371832 0.49446425 0.49334867 0.88604175 1.3365034 1.2237087
1.2839758
## [2,] 0.695483794 0.73759537 0.85764749 0.85254432 0.8533651 0.8212192
0.7672576
## [3,] 0.461058782 0.45832715 0.43104961 0.45248006 0.4873616 0.4848125
0.5380115
## [4,] 0.003097389 0.03543763 0.03253579 0.03483486 0.1252438 0.2346005
0.3679161
##      [,1101]  [,1102]  [,1103]  [,1104]  [,1105]  [,1106]  [,1107]
## [1,] 1.3771662 1.3513560 0.5194302 0.5772227 0.6298973 0.5830343 0.4717174
## [2,] 0.7566867 0.8250486 0.8670240 0.6518957 0.6169856 0.8009179 0.5832292
## [3,] 0.5745957 0.5615660 0.4716736 0.4906793 0.4781947 0.4528747 0.4903169
## [4,] 0.5916115 0.5833890 0.4449081 0.4298444 0.3951378 0.4036337 0.3150864
##      [,1108]  [,1109]  [,1110]  [,1111]  [,1112]  [,1113]
[,1114]
## [1,] 0.3650045 0.3078886 0.1959331 0.08245442 0.3145306 0.3935300
0.1707589
## [2,] 0.8118621 0.9114895 0.9381153 0.82588697 0.9082298 0.9179863
0.9156095
## [3,] 0.4585783 0.4460288 0.4934766 0.55504108 0.5377714 0.5771466
0.5615512
## [4,] 0.3504241 0.4197348 0.7781831 1.01209614 0.8673983 1.0150567
1.0922852
##      [,1115]  [,1116]  [,1117]  [,1118]  [,1119]  [,1120]
```

```

[,1121]
## [1,] 0.5464225 0.6351649 0.005981188 0.4742284 0.5742860 0.01297337
0.5671950
## [2,] 0.9366311 0.8763919 0.643707358 0.5429031 0.6853977 0.72841342
0.8847954
## [3,] 0.5947126 0.6094065 0.569500851 0.6217003 0.6412690 0.63361467
0.6567952
## [4,] 1.1841981 1.2532425 1.092696166 0.9991969 1.1232163 1.21844947
1.0965807
##      [,1122]  [,1123]  [,1124]  [,1125]  [,1126]  [,1127]  [,1128]
## [1,] 0.2533840 0.2802272 0.2985976 0.1141645 0.4228172 0.1942036 0.4185243
## [2,] 0.8370273 0.8542909 0.9029342 0.8528402 0.9104078 0.9114294 0.9235843
## [3,] 0.6795541 0.6495802 0.3572069 0.3037194 0.4382687 0.6674620 0.6835997
## [4,] 1.0254630 1.2018828 1.2174994 1.2327424 1.2517705 1.0755928 0.9823869
##      [,1129]  [,1130]  [,1131]  [,1132]  [,1133]  [,1134]  [,1135]
## [1,] 0.1621745 0.4601175 0.2326054 0.4314331 0.4557891 0.4530942 0.5180496
## [2,] 0.9723329 0.9218097 0.7044662 0.6975980 0.8108865 0.7391437 0.6801144
## [3,] 0.7081782 0.7347482 0.7385537 0.8013173 0.7734031 0.7520269 0.7533532
## [4,] 1.1497336 1.2341586 1.1885102 1.3667437 1.3378729 1.3394568 1.2625170
##      [,1136]  [,1137]  [,1138]  [,1139]  [,1140]  [,1141]
## [1,] 0.4632696 0.3221772 0.2464357 0.6472050 0.308903051 0.275475326
## [2,] 0.4572132 0.4058619 0.5701099 0.5163361 0.554180403 0.838252569
## [3,] 0.7697302 0.7511107 0.7554393 0.6250101 0.522481880 0.538314962
## [4,] 1.2547749 1.1175614 1.1967899 0.3643904 0.001864783 0.001666948
##      [,1142]  [,1143]  [,1144]  [,1145]  [,1146]  [,1147]
## [1,] 0.227359707 0.3004097 0.39968175 0.66872434 0.394618090 0.39466320
## [2,] 0.859230503 0.5988785 0.63620555 0.68418316 0.719664550 0.70415184
## [3,] 0.491505104 0.4953185 0.49137211 0.48909456 0.440028552 0.42882303
## [4,] 0.004005933 0.0329006 0.01205743 0.06537129 0.008737248 0.01172183
##      [,1148]  [,1149]  [,1150]  [,1151]  [,1152]  [,1153]  [,1154]
## [1,] 1.2185029 1.2778918 1.2621989 1.2945987 1.1320237 0.3034705 0.7882014
## [2,] 0.8255166 0.7665204 0.7373042 0.6740458 0.8135674 0.8517360 0.7108842
## [3,] 0.5083917 0.5098518 0.5061200 0.5703868 0.5504508 0.4581878 0.5071592
## [4,] 0.1929945 0.3009474 0.1662400 0.6101181 0.5462680 0.4128209 0.4450676
##      [,1155]  [,1156]  [,1157]  [,1158]  [,1159]  [,1160]  [,1161]
## [1,] 0.5729623 0.5449380 0.5461869 0.5666404 0.4951612 0.3933374 0.2804484
## [2,] 0.7412309 0.8001653 0.8093174 0.8485071 0.9108836 0.9259130 0.8478750
## [3,] 0.4952407 0.4802605 0.4784812 0.5160866 0.5458642 0.5390020 0.5520459
## [4,] 0.3675784 0.3727526 0.3176251 0.6641028 0.8909748 0.8618853 0.9676879
##      [,1162]  [,1163]  [,1164]  [,1165]  [,1166]  [,1167]
##      [,1168]
## [1,] 0.04571905 0.3716356 0.3052858 0.1461676 0.6597120 0.1740177
0.1458994
## [2,] 0.82230094 0.6941945 0.8201679 0.9214418 0.8729356 0.4316944
0.2953373
## [3,] 0.54482654 0.5981113 0.5467117 0.5279352 0.6170149 0.6194813
0.6206860
## [4,] 0.99925965 1.0774048 0.8629623 0.9050633 1.1574381 1.0132840
0.9013690
##      [,1169]  [,1170]  [,1171]  [,1172]  [,1173]  [,1174]

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[,1175]
## [1,] 0.5862249 0.01579078 0.4799174 0.1495851 0.2644615 0.2263303
0.1782753
## [2,] 0.5381120 0.69073561 0.7115624 0.5732027 0.7280147 0.7655913
0.8485885
## [3,] 0.6559859 0.61781918 0.6838778 0.6952221 0.5573855 0.2644078
0.2881219
## [4,] 1.0919521 1.09825608 1.2034061 1.0339466 0.8397087 0.8999698
1.0891768
##      [,1176]  [,1177]  [,1178]  [,1179]  [,1180]  [,1181]  [,1182]
## [1,] 0.2449457 0.2841782 0.2039287 0.2993482 0.1998313 0.3709901 0.3622330
## [2,] 0.9899282 0.9043731 0.8566143 0.8758052 0.9356695 0.6908524 0.7443515
## [3,] 0.3348701 0.7099566 0.7221468 0.7503342 0.7172258 0.7878796 0.8119800
## [4,] 1.0830883 1.1015402 1.0386360 1.1117024 1.1645632 1.2820385 1.3333859
##      [,1183]  [,1184]  [,1185]  [,1186]  [,1187]  [,1188]  [,1189]
## [1,] 0.4044960 0.5250736 0.5311997 0.2884729 0.1375031 0.1175074 0.2485601
## [2,] 0.7578112 0.7364810 0.5571542 0.4259476 0.6336463 0.6994836 0.5269235
## [3,] 0.8393026 0.8167764 0.8316571 0.8414287 0.8137989 0.7954896 0.6408094
## [4,] 1.2605087 1.2899524 1.3159672 1.2252244 1.0130765 1.2387445 0.4519979
##      [,1190]  [,1191]  [,1192]  [,1193]  [,1194]  [,1195]
## [1,] 0.1593881222 0.2240917034 0.300528490 0.3495125 0.5576887 0.66494283
## [2,] 0.4565213574 0.7204441430 0.877136826 0.7443362 0.7876768 0.67055188
## [3,] 0.5292942000 0.5405864278 0.497315486 0.4821605 0.4603088 0.44904517
## [4,] 0.0008924266 0.0004909193 0.003625215 0.1811142 0.1632427 0.02533835
##      [,1196]  [,1197]  [,1198]  [,1199]  [,1200]  [,1201]
## [1,] 0.441172362 0.5714420 1.1646760 1.2635948 1.2163148 1.3087036
0.8840982
## [2,] 0.656441437 0.6342139 0.5723264 0.6652327 0.7332773 0.6402363
0.7886531
## [3,] 0.431081001 0.4542071 0.5165066 0.5117977 0.5229359 0.5700463
0.5250938
## [4,] 0.003158845 0.0669399 0.2414767 0.2417168 0.2360099 0.5561879
0.5645323
##      [,1203]  [,1204]  [,1205]  [,1206]  [,1207]  [,1208]
## [1,] 0.09535558 0.8755320 0.7050089 0.4530588 0.4119347 0.3501249
0.2529629
## [2,] 0.90650615 0.8500048 0.8538849 0.7657707 0.6886931 0.6937839
0.7935167
## [3,] 0.42740466 0.5207013 0.5120361 0.4905046 0.4750806 0.5707898
0.5702436
## [4,] 0.38770764 0.4274229 0.4316557 0.3896680 0.3065795 0.7747271
0.9005822
##      [,1210]  [,1211]  [,1212]  [,1213]  [,1214]  [,1215]  [,1216]
## [1,] 0.2867247 0.2762504 0.2016696 0.2020735 0.5064601 0.1411735 0.3411298
## [2,] 0.7373112 0.6903726 0.7325784 0.7620014 0.7903824 0.7400037 0.7399225
## [3,] 0.5512489 0.5829381 0.5833291 0.6375884 0.6367806 0.5694992 0.6364524
## [4,] 0.7714319 0.9225347 1.0126582 1.1558125 1.0314630 0.7435224 1.0208386
##      [,1217]  [,1218]  [,1219]  [,1220]  [,1221]  [,1222]

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[,1223]
## [1,] 0.3379726 0.05964512 0.5305982 0.009895753 0.3527747 0.1120236
0.3375619
## [2,] 0.7143482 0.64384254 0.6700336 0.737061728 0.8651186 0.9125432
0.8982981
## [3,] 0.6667082 0.67282447 0.7662195 0.700888867 0.7635779 0.6757478
0.6133037
## [4,] 1.1110163 1.11567132 1.3500882 1.355467554 1.4768446 1.1021138
0.9705113
##      [,1224]      [,1225]      [,1226]      [,1227]      [,1228]      [,1229]      [,1230]
## [1,] 0.1594451 0.2083112 0.1680290 0.3100641 0.2958349 0.2551871 0.3459698
## [2,] 0.8826084 0.8629750 0.8832607 0.8531807 0.9135074 0.8565184 0.8156040
## [3,] 0.3498249 0.2894508 0.4824296 0.7678074 0.7921155 0.8252329 0.8525369
## [4,] 1.0409431 1.1058862 1.1839784 1.1898108 1.0386442 1.1111107 1.3017673
##      [,1231]      [,1232]      [,1233]      [,1234]      [,1235]      [,1236]      [,1237]
## [1,] 0.4140745 0.4233418 0.4057978 0.4557142 0.5554215 0.2929966 0.1661371
## [2,] 0.8080010 0.9914411 1.0004452 0.9671581 0.8669912 0.8617846 0.9455388
## [3,] 0.8387551 0.7903098 0.8007342 0.8224384 0.8688678 0.8196877 0.7688716
## [4,] 1.3371396 1.2676840 1.2338657 1.2764872 1.2767296 1.1964904 0.9747718
##      [,1238]      [,1239]      [,1240]      [,1241]      [,1242]      [,1243]
##      [,1244]
## [1,] 0.2364981 0.1497472 0.3853566 0.6810386 0.3498976 0.3576484
0.58659144
## [2,] 1.0362127 0.9040201 0.8526955 1.0441017 0.8962568 0.9510546
0.94884882
## [3,] 0.7329640 0.6450991 0.6229055 0.5929017 0.5221546 0.5052228
0.49654640
## [4,] 0.7981240 0.3949530 0.4300233 0.3537844 0.3273653 0.2468088
0.04510665
##      [,1245]      [,1246]      [,1247]      [,1248]      [,1249]      [,1250]
##      [,1251]
## [1,] 0.55417156 0.49511093 0.8258673 1.2437579 1.1844267 1.0981582
1.3834299
## [2,] 0.91633190 0.98388551 0.9202428 0.8385855 0.8609740 0.9435893
0.6653490
## [3,] 0.47751630 0.43752150 0.4787417 0.5011249 0.5512476 0.5633917
0.5851026
## [4,] 0.03442846 0.07259388 0.2221680 0.2750555 0.4946515 0.6239233
0.4493881
##      [,1252]      [,1253]      [,1254]      [,1255]      [,1256]      [,1257]
##      [,1258]
## [1,] 0.8152791 0.0001235755 0.6108243 1.1448544 0.6132961 0.5892929
0.4802051
## [2,] 0.7600096 0.7787937199 0.7782098 0.7575827 0.7945718 0.8666052
0.8611699
## [3,] 0.5285029 0.4532623384 0.4925496 0.5544497 0.5288715 0.4771684
0.5378324
## [4,] 0.5313995 0.4376896241 0.4310591 0.5161506 0.4557291 0.3327047
0.7593541
##      [,1259]      [,1260]      [,1261]      [,1262]      [,1263]      [,1264]      [,1265]

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## [1,] 0.3380221 0.3193443 0.2289216 0.2937799 0.3905221 0.3086674 0.4345458
## [2,] 0.7905921 0.7676265 0.7676992 0.8499949 0.9121977 0.8869572 0.8520917
## [3,] 0.5977806 0.5677791 0.5761888 0.5991102 0.6469424 0.6733265 0.6731508
## [4,] 0.9546898 0.6952048 0.8295460 0.9151638 1.0329511 1.1878749 0.9173611
##      [,1266]  [,1267]  [,1268]  [,1269]  [,1270]  [,1271]
[,1272]
## [1,] 0.2633528 0.3506672 0.07187617 0.4732873 0.03700756 0.3013697
0.1910757
## [2,] 0.9458623 0.9202627 0.67966786 0.4602195 0.45100546 0.7826830
0.7430197
## [3,] 0.6312238 0.7173804 0.73749974 0.8242236 0.80261052 0.7828094
0.7716761
## [4,] 0.8071170 1.1293939 1.14724687 1.2735714 1.30245366 1.3632341
0.9912901
##      [,1273]  [,1274]  [,1275]  [,1276]  [,1277]  [,1278]  [,1279]
## [1,] 0.2568895 0.1089931 0.1693833 0.1550867 0.3959901 0.3121110 0.3733048
## [2,] 0.6087409 0.7448527 0.8398871 0.7165413 0.5398081 0.8563899 0.7513755
## [3,] 0.5911119 0.3805325 0.3378123 0.4428734 0.7864633 0.7835258 0.8339529
## [4,] 1.0608560 1.2219424 1.3184725 1.3160891 1.0464200 1.0037179 1.3044085
##      [,1280]  [,1281]  [,1282]  [,1283]  [,1284]  [,1285]  [,1286]
## [1,] 0.4096429 0.3799634 0.3474809 0.3648278 0.4347685 0.5671790 0.3014338
## [2,] 0.5489580 0.4791097 0.4996262 0.6841341 1.0153623 0.9111610 0.7648608
## [3,] 0.8702445 0.8535772 0.8534436 0.8402969 0.8096134 0.8698893 0.8096137
## [4,] 1.3369099 1.2488433 1.2118387 1.1986124 1.2785686 1.3132315 1.0535084
##      [,1287]  [,1288]  [,1289]  [,1290]  [,1291]  [,1292]  [,1293]
## [1,] 0.1190598 0.3171599 0.6366109 1.0153413 1.0452932 0.4351782 0.3560563
## [2,] 0.8201185 0.7245733 0.6968071 0.5771458 0.8077917 0.8230349 0.7603141
## [3,] 0.7658105 0.7929345 0.8069893 0.8265439 0.7295910 0.6547321 0.5768946
## [4,] 1.0659109 0.8032533 0.8389698 0.8039451 0.6072362 0.5261491 0.1718520
##      [,1294]  [,1295]  [,1296]  [,1297]  [,1298]  [,1299]
[,1300]
## [1,] 0.47812924 0.5085822 0.4416824 0.9686982 1.1785871 1.1258092
1.2705856
## [2,] 0.84240490 0.8562868 0.8037813 0.7176585 0.8551155 0.9136022
0.8691297
## [3,] 0.57304235 0.5921042 0.5706836 0.5970331 0.6075519 0.5625351
0.5435867
## [4,] 0.05607855 0.1158267 0.2057779 0.2417956 0.3981002 0.4827846
0.3167621
##      [,1301]  [,1302]  [,1303]  [,1304]  [,1305]  [,1306]
[,1307]
## [1,] 1.3429037 0.7661902 0.009177263 0.5484883 1.2390752 0.6058716
0.4563836
## [2,] 0.8791232 0.8499460 0.838802823 0.7602290 0.8312134 0.8861904
0.9751016
## [3,] 0.5355452 0.5063503 0.428365338 0.5163098 0.5756331 0.5221854
0.4960003
## [4,] 0.3364255 0.3239878 0.330575082 0.4002165 0.5287566 0.4946961
0.3894389
##      [,1308]  [,1309]  [,1310]  [,1311]  [,1312]  [,1313]  [,1314]

```

```

## [1,] 0.5082603 0.4134868 0.3484634 0.4073272 0.4503120 0.5449212 0.4518391
## [2,] 0.9402098 0.8804227 0.9957955 1.0021990 0.9747076 0.9832155 1.0180834
## [3,] 0.5208170 0.6060653 0.5417233 0.5427766 0.6139687 0.6470146 0.6691723
## [4,] 0.6468113 1.1082901 0.7759695 0.7559441 0.8951162 0.9494601 1.1071500
##      [,1315]  [,1316]  [,1317]  [,1318]  [,1319]  [,1320]
[,1321]
## [1,] 0.2335591 0.4645629 0.3252780 0.08887525 0.5175185 0.05723143
0.3835857
## [2,] 1.0146372 1.0004035 0.9897982 0.85276078 0.7678236 0.81749364
0.8566516
## [3,] 0.6835829 0.7201146 0.7189267 0.71651656 0.7563790 0.73889201
0.7269077
## [4,] 1.1439571 1.1809747 1.1630466 1.09371909 1.1320878 1.07144383
1.1119612
##      [,1322]  [,1323]  [,1324]  [,1325]  [,1326]  [,1327]
[,1328]
## [1,] 0.2450683 0.2537625 0.04327521 0.2019442 0.1614194 0.3510238
0.3780328
## [2,] 0.8390308 0.7956181 0.95677576 0.9773948 0.8645752 0.9744498
1.0897253
## [3,] 0.7044239 0.4410376 0.22609176 0.2784740 0.2820014 0.6366519
0.7966971
## [4,] 0.8234289 0.8954595 1.21218495 1.3446705 1.1908080 1.0769909
1.2508371
##      [,1329]  [,1330]  [,1331]  [,1332]  [,1333]  [,1334]  [,1335]
## [1,] 0.4791112 0.4594411 0.3288446 0.3326893 0.2797069 0.3331677 0.4791270
## [2,] 1.0339548 0.9793869 0.8845781 0.7150755 0.5904701 0.8175622 0.9276974
## [3,] 0.8288869 0.8020705 0.8352756 0.8020169 0.8100040 0.7672151 0.7505450
## [4,] 1.4319734 1.3031171 1.2320214 1.2741623 1.2257492 1.1724913 1.1544107
##      [,1336]  [,1337]  [,1338]  [,1339]  [,1340]  [,1341]  [,1342]
## [1,] 0.3138620 0.6495453 0.9177581 1.0283649 1.0405791 1.0621615 0.5121212
## [2,] 0.7259598 0.7448536 0.8225034 0.6893351 0.6125931 0.6515946 0.8664035
## [3,] 0.7217928 0.7778814 0.7128307 0.7285666 0.7451291 0.7532762 0.6492352
## [4,] 1.0631923 1.2205059 0.7428234 0.7197561 0.7579907 0.7655539 0.7318115
##      [,1343]  [,1344]  [,1345]  [,1346]  [,1347]  [,1348]  [,1349]
## [1,] 0.1980848 0.3202099 0.3752653 0.4189033 0.9848472 1.2711822 1.2476861
## [2,] 0.7867531 0.8453185 0.9780442 0.9716909 0.9602689 0.9171694 1.0045482
## [3,] 0.6053811 0.5974371 0.5491391 0.5607906 0.5881037 0.6187452 0.5361654
## [4,] 0.4713081 0.3412611 0.2774647 0.1877638 0.1540466 0.2422878 0.1064582
##      [,1350]  [,1351]  [,1352]  [,1353]  [,1354]  [,1355]
[,1356]
## [1,] 1.24384933 1.3052016 0.6994624 0.0210939 0.4697501 1.3449302
1.0527975
## [2,] 1.00114157 0.8430137 0.8301347 0.9801778 0.8715273 0.9102865
0.8221443
## [3,] 0.49817896 0.5610910 0.5006130 0.4225129 0.4940467 0.5937975
0.5748226
## [4,] 0.06356383 0.3993819 0.2789312 0.2946677 0.4325888 0.5681996
0.5557489
##      [,1357]  [,1358]  [,1359]  [,1360]  [,1361]  [,1362]  [,1363]

```

```
## [1,] 0.7019181 0.6457910 0.4975405 0.4880091 0.5216802 0.9227874 1.0857719
## [2,] 0.8667506 0.7704513 0.9252400 1.0086775 1.0206260 1.0320698 1.0334795
## [3,] 0.5313329 0.5286908 0.5997689 0.5753843 0.5404091 0.6058309 0.6500586
## [4,] 0.4317612 0.4646314 1.0111929 0.9335986 0.6787611 0.8465280 1.0720914
##      [,1364]  [,1365]  [,1366]  [,1367]  [,1368]  [,1369]  [,1370]
## [1,] 0.6058132 0.3904247 0.5426002 0.3413865 0.2231898 0.5588949 0.0846825
## [2,] 0.9961735 1.0098742 1.0384589 0.9732237 0.8643942 0.7918722 0.8577280
## [3,] 0.6260963 0.6356644 0.6775990 0.6576492 0.6304471 0.6940071 0.6036233
## [4,] 1.0033314 1.2372571 1.3219201 1.1811307 1.1311426 1.1874382 0.9549943
##      [,1371]  [,1372]  [,1373]  [,1374]  [,1375]  [,1376]  [,1377]
## [1,] 0.4674942 0.1855190 0.3021913 0.1544050 0.1762521 0.3588943 0.3960786
## [2,] 0.8210146 0.7187231 0.6574433 0.7544668 0.5143562 0.4597787 0.7002934
## [3,] 0.6569232 0.6663701 0.4982730 0.3276166 0.3077377 0.4361485 0.6025234
## [4,] 0.9631691 0.9387299 0.8413751 1.2005349 1.2963843 1.1149886 1.1980309
##      [,1378]  [,1379]  [,1380]  [,1381]  [,1382]  [,1383]  [,1384]
## [1,] 0.4064706 0.4037554 0.4082774 0.3300215 0.2590406 0.2976499 0.2333470
## [2,] 0.8082449 0.8492846 0.7935697 0.7515977 0.8427237 0.7382283 0.7528493
## [3,] 0.7265855 0.6784242 0.6623648 0.7221876 0.6697305 0.6755650 0.6333327
## [4,] 1.3159635 1.2591108 1.2562586 1.3142179 1.2667711 1.2235598 1.0604452
##      [,1385]  [,1386]  [,1387]  [,1388]  [,1389]  [,1390]  [,1391]
## [1,] 0.2471743 0.7337945 0.9846298 0.9443394 1.0225924 1.1111219 1.0298855
## [2,] 0.7123203 0.8338548 0.7164989 0.7239074 0.9687847 1.0377903 0.8390777
## [3,] 0.6374531 0.7138848 0.7291645 0.6653995 0.6309603 0.6337994 0.6679103
## [4,] 1.0332055 1.2167722 1.1395184 0.6191382 0.4806041 0.5545419 0.5484104
##      [,1392]  [,1393]  [,1394]  [,1395]  [,1396]  [,1397]
##      [,1398]
## [1,] 0.8298100 0.3771089 0.2283385 0.2362740 0.33604450 1.0261231
1.40879043
## [2,] 0.8423554 0.7812038 0.8794120 1.0394958 1.00714812 0.9972579
0.91434352
## [3,] 0.6267012 0.6181723 0.5611553 0.5290162 0.52451524 0.5622894
0.54561860
## [4,] 0.4951519 0.4403963 0.2245790 0.1921854 0.03106727 0.1170199
0.08566958
##      [,1399]  [,1400]  [,1401]  [,1402]  [,1403]  [,1404]
##      [,1405]
## [1,] 1.3402400 1.3186770 1.3126585 0.7486889 0.001607567 0.5092304
1.3441357
## [2,] 1.0453175 1.0425954 0.8603518 0.7535522 1.012592954 0.9373283
0.9242553
## [3,] 0.5202021 0.4782668 0.5562641 0.5199448 0.422246193 0.4752376
0.5826180
## [4,] 0.1134875 0.1430292 0.4191538 0.3403800 0.235310074 0.3277437
0.5110112
##      [,1406]  [,1407]  [,1408]  [,1409]  [,1410]  [,1411]  [,1412]
## [1,] 1.0583445 0.5885766 0.7112935 0.6420075 0.6707803 0.7294856 1.1826700
## [2,] 0.9072013 0.9894843 0.9597215 1.0070936 1.0090146 1.0057960 1.0774968
## [3,] 0.5764276 0.5230320 0.5184416 0.6191939 0.6229519 0.5784858 0.5929475
## [4,] 0.5579614 0.4474690 0.3846492 0.8919822 1.0243938 0.8197383 0.7363554
##      [,1413]  [,1414]  [,1415]  [,1416]  [,1417]  [,1418]  [,1419]
```

```

## [1,] 1.2473383 1.0288500 0.6373837 0.6904445 0.5141291 0.5021106 0.4825078
## [2,] 1.0725346 0.9733455 0.9748694 0.9982821 1.0444236 0.9965770 0.9168332
## [3,] 0.6509567 0.6390402 0.6120173 0.6355097 0.6288192 0.6273720 0.6689315
## [4,] 0.9583683 1.0288041 1.0170351 1.1841476 1.1688076 1.1936210 1.2255234
##      [,1420]  [,1421]  [,1422]  [,1423]  [,1424]  [,1425]  [,1426]
## [1,] 0.3975844 0.4126827 0.3812220 0.3337324 0.2900855 0.2636221 0.5555151
## [2,] 0.8918890 0.8393443 0.7102581 0.8189827 0.7908158 0.5615407 0.6888900
## [3,] 0.5981417 0.6214561 0.6377988 0.3389094 0.2879708 0.2542664 0.4593569
## [4,] 1.1181188 1.1699830 1.2541319 0.8360272 1.0967733 1.3120069 1.1999032
##      [,1427]  [,1428]  [,1429]  [,1430]  [,1431]  [,1432]  [,1433]
## [1,] 0.4208662 0.4421999 0.4037200 0.2827973 0.2478538 0.3056941 0.2988726
## [2,] 0.4998521 0.5764325 0.7411694 0.6619940 0.5836453 0.7044591 0.7078824
## [3,] 0.5789108 0.6841902 0.6505219 0.6745244 0.6627704 0.6583470 0.6834103
## [4,] 1.1689645 1.1029128 1.0966546 1.2029769 1.2232003 1.1739426 1.0645640
##      [,1434]  [,1435]  [,1436]  [,1437]  [,1438]  [,1439]  [,1440]
## [1,] 0.2599295 0.3604747 0.9377699 1.0660474 1.1657347 1.2270161 0.9287102
## [2,] 0.6820920 0.6974001 0.7763202 0.5921234 0.5302673 0.6980453 0.8364508
## [3,] 0.6547717 0.6696427 0.7480211 0.7513891 0.6862856 0.6724168 0.6716152
## [4,] 1.0441665 1.0558717 1.1993605 1.0487063 0.4873943 0.5171080 0.6818603
##      [,1441]  [,1442]  [,1443]  [,1444]  [,1445]  [,1446]
##      [,1447]
## [1,] 0.5237559 0.5639531 0.5165667 0.22308926 0.18661591 0.308730992
0.81445808
## [2,] 0.8662629 0.8748511 0.7135431 0.67607693 0.75026037 0.913030295
0.86094185
## [3,] 0.5855714 0.5743732 0.5881129 0.53300452 0.49474982 0.485829807
0.50026768
## [4,] 0.4656188 0.3970911 0.2419403 0.05615042 0.01141287 0.004622348
0.07038065
##      [,1448]  [,1449]  [,1450]  [,1451]  [,1452]  [,1453]
##      [,1454]
## [1,] 1.03587024 0.93590736 0.91665834 1.3052170 0.8608085 0.09232856
0.6016117
## [2,] 0.77413183 0.92556416 0.94740071 0.9424226 0.7049187 0.86298613
0.9257220
## [3,] 0.51873302 0.47596629 0.47590296 0.5489811 0.5628894 0.46085366
0.5051966
## [4,] 0.09002581 0.07926789 0.06162883 0.3260662 0.3378161 0.25782955
0.2823101
##      [,1455]  [,1456]  [,1457]  [,1458]  [,1459]  [,1460]  [,1461]
## [1,] 1.3328983 1.0945231 0.8287146 0.8601350 0.7317468 0.6746113 0.9123201
## [2,] 0.8257673 0.9437352 1.0160685 1.0451253 1.0881666 1.0719541 1.0305080
## [3,] 0.5574033 0.5429815 0.5416125 0.4905043 0.5961566 0.6407076 0.6188286
## [4,] 0.3410782 0.4396103 0.3841214 0.1940581 0.9014753 1.1794664 0.9992302
##      [,1462]  [,1463]  [,1464]  [,1465]  [,1466]  [,1467]  [,1468]
## [1,] 1.2083101 1.1824800 1.1911402 1.167445 1.0614940 0.8646314 0.7852286
## [2,] 1.0459364 1.0599926 1.0413382 1.036483 0.9961257 1.0269023 1.1106599
## [3,] 0.6291878 0.6353648 0.6442208 0.667605 0.6613014 0.6651057 0.6488342
## [4,] 0.7710254 0.7340393 0.9609552 1.031060 1.0861897 1.1773136 1.1588784
##      [,1469]  [,1470]  [,1471]  [,1472]  [,1473]  [,1474]  [,1475]

```



```

## [1,] 0.5887421 0.5543902 0.4711904 0.4421933 0.3846278 0.3265079 0.5287900
## [2,] 1.0114887 0.9122933 0.9742199 0.9387098 1.0309134 1.0045319 1.0439647
## [3,] 0.6616584 0.6565369 0.6724303 0.6233644 0.1497394 0.1611669 0.2340741
## [4,] 1.1382487 1.1801878 1.1931779 1.1417697 0.7194907 0.9024568 1.1730991
##      [,1476]  [,1477]  [,1478]  [,1479]  [,1480]  [,1481]  [,1482]
## [1,] 0.4509605 0.4743077 0.6064081 0.5640043 0.4571442 0.4053655 0.3077226
## [2,] 1.0345540 1.0335750 1.0577520 0.9981846 1.0205423 1.0008118 0.9254821
## [3,] 0.2377786 0.3750691 0.6523385 0.6272806 0.6465362 0.6289847 0.6204087
## [4,] 1.1234449 1.0769306 1.0927905 1.1152262 1.1548065 1.1186766 1.0586190
##      [,1483]  [,1484]  [,1485]  [,1486]  [,1487]  [,1488]  [,1489]
## [1,] 0.3221172 0.4381515 0.9403645 1.2566364 1.1818312 1.2521606 1.1855738
## [2,] 0.9040275 0.9774465 0.9340151 0.7794752 0.8263638 0.8779316 0.8622526
## [3,] 0.6208434 0.6072781 0.7021052 0.7227144 0.6782310 0.5990774 0.6232897
## [4,] 1.0167305 1.0776210 1.1502038 1.1311037 0.8107883 0.4287736 0.6008710
##      [,1490]  [,1491]  [,1492]  [,1493]  [,1494]  [,1495]
## [1,] 0.5456909 0.3122769 0.2481619 0.17629732 0.207657604 0.187719707
## [2,] 0.8978713 0.8871956 0.9171404 0.82851717 0.736183663 0.776035302
## [3,] 0.5567471 0.5642435 0.4984972 0.45497904 0.467713079 0.416719273
## [4,] 0.5310904 0.3696550 0.2574961 0.05659557 0.006320151 0.002455259
##      [,1496]  [,1497]  [,1498]  [,1499]  [,1500]  [,1501]
## [1,] 0.23578841 0.432735594 0.345858293 0.252407297 0.324400068 1.3832053
## [2,] 0.88271617 0.864140823 0.794695671 0.745950172 0.811343736 0.9730024
## [3,] 0.42993978 0.444884610 0.455156964 0.427670747 0.443737405 0.5599790
## [4,] 0.01089667 0.002297726 0.002547721 0.007511348 0.001169894 0.2319171
##      [,1502]  [,1503]  [,1504]  [,1505]  [,1506]  [,1507]
##      [,1508]
## [1,] 0.9238482 0.07570974 0.6945522 1.4677779 0.9157788 0.7951140
1.00578237
## [2,] 0.7436607 0.78702816 0.8918112 0.7611755 0.8863675 1.0114085
1.12329432
## [3,] 0.5506368 0.46862529 0.5208234 0.6025872 0.5463533 0.5141681
0.49255667
## [4,] 0.1929138 0.21943641 0.3157155 0.2547939 0.2544107 0.2220511
0.05404696
##      [,1509]  [,1510]  [,1511]  [,1512]  [,1513]  [,1514]  [,1515]
## [1,] 0.8473202 0.6432847 1.0578869 1.2906358 1.3304824 1.1991546 1.1986602
## [2,] 1.1473871 1.0678791 1.0631901 1.0825229 1.1466540 1.1289768 1.1111452
## [3,] 0.5665514 0.6553983 0.6878785 0.6971757 0.6551041 0.6174067 0.6700382
## [4,] 0.6166569 1.1015544 1.1347885 1.0672100 0.7800256 0.7304476 1.0101636
##      [,1516]  [,1517]  [,1518]  [,1519]  [,1520]  [,1521]  [,1522]
## [1,] 1.2203741 1.2317765 1.1396049 0.9798874 0.9319785 0.9418676 0.9143669
## [2,] 1.0367973 1.0304815 1.0954110 0.9994640 0.8844229 0.8981733 0.8773505
## [3,] 0.6688408 0.6970944 0.6621763 0.6673976 0.6997871 0.6977801 0.4935552
## [4,] 1.0146842 1.0686450 1.1503530 1.1910956 1.1607764 1.1201991 1.0391185
##      [,1523]  [,1524]  [,1525]  [,1526]  [,1527]  [,1528]  [,1529]
## [1,] 0.8685919 0.8975221 1.0650215 0.9373848 0.8382318 0.7776543 0.6556307
## [2,] 0.9058695 0.9441112 0.9885403 0.9652096 1.0761544 0.9702044 0.9042107
## [3,] 0.1541706 0.1827557 0.2127931 0.1792818 0.2935315 0.6218466 0.7054324
## [4,] 0.8847290 0.9423069 1.0667017 1.0614175 1.0585230 1.0659132 1.1097113
##      [,1530]  [,1531]  [,1532]  [,1533]  [,1534]  [,1535]  [,1536]

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## [1,] 0.5659963 0.4312439 0.4394440 0.8282218 1.0677093 1.0561922 1.0477160
## [2,] 1.0489879 1.0883006 1.0436736 0.9807607 0.9935404 0.9951621 0.9130627
## [3,] 0.6313787 0.6375145 0.6113535 0.6574079 0.6893481 0.6522818 0.6897346
## [4,] 1.1603835 1.1046625 1.0108683 1.1006142 1.1108458 1.0383695 1.0201995
##      [,1537]  [,1538]  [,1539]  [,1540]  [,1541]  [,1542]
[,1543]
## [1,] 0.8681022 0.7172829 0.6166361 0.4427479 0.2835736 0.2713706
0.41676637
## [2,] 0.9925656 1.0610422 1.0322412 1.0461747 1.0228353 0.9854878
0.98935560
## [3,] 0.6086253 0.5263933 0.5264180 0.5141796 0.5146850 0.4593097
0.47033184
## [4,] 0.6176420 0.2709263 0.3341206 0.3431390 0.3008146 0.1342782
0.03123969
##      [,1544]  [,1545]  [,1546]  [,1547]  [,1548]  [,1549]
## [1,] 0.31870611 0.135464021 0.0722494969 0.241073662 0.5182893 0.60584970
## [2,] 0.97870025 1.008939593 1.0048798708 1.014106007 0.9760627 0.97654807
## [3,] 0.44083615 0.401297092 0.4170967991 0.443636384 0.4766255 0.46415690
## [4,] 0.01353343 0.005704638 0.0005482122 0.001464289 0.0144625 0.02193166
##      [,1550]  [,1551]  [,1552]  [,1553]  [,1554]  [,1555]
[,1556]
## [1,] 0.56867168 1.3382444 1.0063868 0.08045813 0.5382208 0.9348385
0.7159104
## [2,] 0.96580777 0.5531932 0.3267077 0.29698755 0.4448514 0.4456727
0.5858674
## [3,] 0.46466749 0.6281268 0.5976516 0.52371945 0.5803402 0.5988142
0.5524101
## [4,] 0.05298152 0.4136986 0.2428291 0.15280945 0.2965399 0.2533236
0.2085656
##      [,1557]  [,1558]  [,1559]  [,1560]  [,1561]  [,1562]  [,1563]
## [1,] 0.8258181 0.8570874 0.7126515 0.6233168 1.2738770 1.3380238 1.3358781
## [2,] 0.6739383 0.7801318 0.8088785 0.6913440 0.6866847 0.7707925 0.8322563
## [3,] 0.5569162 0.5489788 0.5182708 0.5415276 0.6587950 0.7154506 0.7155728
## [4,] 0.1783852 0.2560307 0.1574862 0.2216126 0.6626181 1.0112527 1.0117919
##      [,1564]  [,1565]  [,1566]  [,1567]  [,1568]  [,1569]  [,1570]
## [1,] 1.3420288 1.3415426 1.2304352 1.2306280 1.2134644 1.1448427 1.1300634
## [2,] 0.7598967 0.6797114 0.5629535 0.5270464 0.7767299 0.6705073 0.3294354
## [3,] 0.6848198 0.6792496 0.7245914 0.7392463 0.7270041 0.7521712 0.7919754
## [4,] 0.8271921 0.7861215 0.9277061 0.9907204 1.0108806 1.0766094 1.0669245
##      [,1571]  [,1572]  [,1573]  [,1574]  [,1575]  [,1576]  [,1577]
## [1,] 1.2546597 1.1864781 0.9728178 1.0474823 1.1986612 0.6553329 0.4312574
## [2,] 0.5599359 0.5030028 0.4766939 0.6266712 0.6348645 0.7626153 0.7348657
## [3,] 0.6966948 0.3143188 0.2491607 0.2257056 0.2100829 0.2245774 0.1694384
## [4,] 1.1311816 1.1123058 1.1143397 1.0238474 1.0275951 0.9826041 0.9743534
##      [,1578]  [,1579]  [,1580]  [,1581]  [,1582]  [,1583]  [,1584]
## [1,] 0.7346195 0.6881244 0.5404507 0.4321441 0.4448693 0.9373539 0.8617997
## [2,] 0.7788573 0.4826623 0.4773261 0.7464049 0.9322371 0.9534519 0.8614383
## [3,] 0.4073101 0.7526345 0.7011331 0.6705186 0.6270284 0.6713397 0.6736605
## [4,] 1.0853812 1.1075912 1.0875045 0.9741063 0.9534757 1.0482247 0.9483139
##      [,1585]  [,1586]  [,1587]  [,1588]  [,1589]  [,1590]  [,1591]

```

```
## [1,] 0.7170851 0.7395693 0.7754147 0.7306875 0.7113512 0.4849710 0.2774530
## [2,] 0.7319325 0.8178996 0.6781534 0.6910024 0.9643204 0.9707946 0.9201871
## [3,] 0.6578434 0.6375672 0.5661666 0.5709119 0.5242283 0.5133504 0.5331764
## [4,] 0.8140719 0.8285210 0.2713397 0.1778235 0.2066700 0.2175068 0.3291528
##      [,1592]      [,1593]      [,1594]      [,1595]      [,1596]      [,1597]
## [1,] 0.3282552 0.32597438 0.219111043 0.099590488 0.086308281 0.391420980
## [2,] 0.8672972 0.79036446 0.884286338 0.911378640 0.954902882 1.003488597
## [3,] 0.5226435 0.48616366 0.447096524 0.413127603 0.429534902 0.458664852
## [4,] 0.2254899 0.08683122 0.003441815 0.008659846 0.003324413 0.006637422
##      [,1598]      [,1599]      [,1600]      [,1601]      [,1602]      [,1603]
## [1,] 0.73407881 0.7674263 0.7184786 1.179058654 0.88370341 0.13015022
## [2,] 1.08183606 1.0382733 0.9638424 0.001733394 0.03882281 0.06087001
## [3,] 0.50129119 0.5116351 0.5120648 0.720127480 0.62377312 0.54618771
## [4,] 0.05125698 0.2463427 0.1426500 0.453187583 0.34365059 0.10478435
##      [,1604]      [,1605]      [,1606]      [,1607]      [,1608]      [,1609]
##      [,1610]
## [1,] 0.36614986 0.5218358 0.6878610 0.7634919 0.7378853 0.5514753
0.69457242
## [2,] 0.02637551 0.0659229 0.1053522 0.1087484 0.1175178 0.1307587
0.10750372
## [3,] 0.61999497 0.5895011 0.6567730 0.6217283 0.6078800 0.6115753
0.57771068
## [4,] 0.18406874 0.2109590 0.2218591 0.2490557 0.2173661 0.2353024
0.06949955
##      [,1611]      [,1612]      [,1613]      [,1614]      [,1615]      [,1616]
##      [,1617]
## [1,] 1.27039973 1.3392759 1.2498457 1.1929706 1.17474941 1.148291471
1.15805147
## [2,] 0.17332839 0.1939420 0.1767123 0.1859235 0.07001232 0.004710302
0.02714479
## [3,] 0.63286457 0.6858449 0.7545253 0.7560288 0.75567871 0.768384983
0.77711447
## [4,] 0.03639136 0.3670304 0.8442182 0.8945364 0.84803090 0.799364404
0.87735459
##      [,1618]      [,1619]      [,1620]      [,1621]      [,1622]      [,1623]
## [1,] 1.0960185 1.1072105 1.1170004 1.13716401 1.18649266 1.073430720
## [2,] 0.2834734 0.1698392 0.1107843 0.05736154 0.01032214 0.003498416
## [3,] 0.7713470 0.7744456 0.7960807 0.81423828 0.56592220 0.325454389
## [4,] 0.9395508 0.9597635 1.0201168 1.05777769 1.09140140 1.073832105
##      [,1624]      [,1625]      [,1626]      [,1627]      [,1628]      [,1629]
## [1,] 0.956006593 0.9975156 0.9366788 0.93281593 0.7663407 0.54908615
## [2,] 0.001979138 0.1412987 0.1174755 0.08438164 0.1157751 0.08224887
## [3,] 0.369379668 0.3083085 0.3304130 0.36803120 0.6683526 0.76680545
## [4,] 1.021305087 0.9775857 1.0003283 1.10903669 1.1550575 0.99853584
##      [,1630]      [,1631]      [,1632]      [,1633]      [,1634]      [,1635]
##      [,1636]
## [1,] 0.519846880 0.3235955 0.4786872 0.6656549 0.5349933 0.4579658
0.4720782
## [2,] 0.002514721 0.1505983 0.2795752 0.2807772 0.2203244 0.2238199
0.2559434
```

```
## [3,] 0.749208762 0.6743566 0.7073763 0.6839936 0.6718389 0.6859041
0.6321726
## [4,] 0.936551055 0.8724866 0.8759164 0.8278886 0.6433476 0.7585697
0.4150052
##      [,1637]      [,1638]      [,1639]      [,1640]      [,1641]      [,1642]
[,1643]
## [1,] 0.45388021 0.34350800 0.33192904 0.2416350 0.1837520 0.1617669
0.1443168
## [2,] 0.16885716 0.14251609 0.27377993 0.4808434 0.5794065 0.3059212
0.5329295
## [3,] 0.57383202 0.57752891 0.56365583 0.5728574 0.5630324 0.5876545
0.5549282
## [4,] 0.08688691 0.08839408 0.08103286 0.2947970 0.4866522 0.3326704
0.2746580
##      [,1644]      [,1645]      [,1646]      [,1647]      [,1648]      [,1649]
[,1650]
## [1,] 0.1696822 0.13211172 0.09461321 0.169940390 0.1862697 0.1709115
0.2513457
## [2,] 0.6790777 0.30556459 0.28255338 0.372289080 0.4025089 0.3375913
0.3014314
## [3,] 0.5260063 0.53058750 0.50591328 0.494480408 0.5305890 0.5808476
0.5442945
## [4,] 0.2373713 0.04917089 0.01246251 0.001398765 0.1200720 0.3816460
0.2673193
##      [,1651]      [,1652]      [,1653]      [,1654]      [,1655]      [,1656]
[,1657]
## [1,] 1.08464703 0.85589715 0.2058899 0.40449129 0.6755374 0.7707032
0.66529267
## [2,] 0.04640321 0.08207656 0.1125447 0.09232092 0.1022012 0.1059669
0.07967276
## [3,] 0.67820841 0.73355264 0.6178128 0.63471472 0.6546096 0.6572269
0.64615844
## [4,] 0.34459716 0.31112963 0.1686306 0.25100302 0.2458120 0.2452983
0.30849397
##      [,1658]      [,1659]      [,1660]      [,1661]      [,1662]      [,1663]
[,1664]
## [1,] 0.65100041 0.5976571 0.74783790 1.0629289 1.0538867 1.05744930
0.9841835
## [2,] 0.08827983 0.1386665 0.07146835 0.1000945 0.1211446 0.06878533
0.1199959
## [3,] 0.65224050 0.6301352 0.66929204 0.6513827 0.6564548 0.76891625
0.7560887
## [4,] 0.28600846 0.2920925 0.31322556 0.1288924 0.2183081 0.72462278
0.7513087
##      [,1665]      [,1666]      [,1667]      [,1668]      [,1669]      [,1670]
## [1,] 0.97476373 0.90877122 0.92604364 0.96100350 1.01581669 0.9878995
## [2,] 0.09924952 0.09610872 0.07808868 0.04419587 0.07015606 0.1135558
## [3,] 0.75865029 0.74819255 0.76754449 0.76315842 0.75252278 0.8107485
## [4,] 0.81677241 0.84495447 0.81712246 0.86025151 0.88931934 0.9557162
##      [,1671]      [,1672]      [,1673]      [,1674]      [,1675]      [,1676]
```

```
## [1,] 0.88972316 0.77962808 0.60451687 0.41412441 0.32311595 0.38336573
## [2,] 0.05502033 0.07742714 0.09476582 0.09373216 0.08691586 0.07494387
## [3,] 0.76710152 0.46261691 0.41272099 0.35110538 0.31424484 0.34081218
## [4,] 1.00357770 1.08122354 1.07597230 1.01572561 0.96440339 0.89442778
##      [,1677]      [,1678]      [,1679]      [,1680]      [,1681]      [,1682]
      [,1683]
## [1,] 0.54905411 0.59617185 0.5161466 0.3661332 0.1748728 0.40341423
      0.12969103
## [2,] 0.08538461 0.05154934 0.0772224 0.1217571 0.1021646 0.06032659
      0.08653163
## [3,] 0.31265895 0.62500308 0.7490976 0.6992606 0.6713285 0.69478880
      0.62722133
## [4,] 0.87170747 0.91457789 0.8896494 0.7908528 0.7004828 0.65690677
      0.45640546
##      [,1684]      [,1685]      [,1686]      [,1687]      [,1688]      [,1689]
      [,1690]
## [1,] 0.1330419 0.1305841 0.12398021 0.1645592 0.1090653 0.1433709
      0.1277198
## [2,] 0.1074242 0.0980893 0.13182314 0.1118048 0.1445432 0.1001011
      0.1093111
## [3,] 0.6562721 0.6401925 0.57873477 0.5916910 0.5864264 0.6212400
      0.6222584
## [4,] 0.5739186 0.5134700 0.08508657 0.1431023 0.2272619 0.3274678
      0.4171299
##      [,1691]      [,1692]      [,1693]      [,1694]      [,1695]      [,1696]
      [,1697]
## [1,] 0.1431371 0.11149585 0.08640938 0.1621565 0.21229673 0.2336689
      0.33909085
## [2,] 0.1712743 0.08194653 0.11283545 0.1210079 0.05889477 0.0861488
      0.05324045
## [3,] 0.5911512 0.60246515 0.59173512 0.5922639 0.61491065 0.5956663
      0.57958597
## [4,] 0.3974715 0.36020624 0.30290199 0.3202228 0.27960496 0.1899597
      0.19382653
##      [,1698]      [,1699]      [,1700]      [,1701]      [,1702]      [,1703]
      [,1704]
## [1,] 0.38968868 0.4741011 0.47515818 0.5865912 0.3767161 0.1602666
      0.3807653
## [2,] 0.08607503 0.1131660 0.10772635 0.1122531 0.1099699 0.1409961
      0.1164813
## [3,] 0.59207440 0.6243139 0.57090205 0.6765055 0.6814972 0.5172529
      0.6303644
## [4,] 0.33396767 0.3841827 0.08501836 0.3209414 0.3069117 0.2722343
      0.3233812
##      [,1705]      [,1706]      [,1707]      [,1708]      [,1709]      [,1710]
      [,1711]
## [1,] 0.7798978 0.8404089 0.7086682 0.7581700 0.68443538 0.86783247
      0.91210295
## [2,] 0.1291790 0.1608173 0.1487203 0.1409475 0.08087205 0.05325482
      0.09618091
```

```
## [3,] 0.7036087 0.6115025 0.6274988 0.6457039 0.62972130 0.65627018
0.62606836
## [4,] 0.3372110 0.2569092 0.3547610 0.3595307 0.37958860 0.44439698
0.16831320
##      [,1712]  [,1713]  [,1714]  [,1715]  [,1716]  [,1717]
[,1718]
## [1,] 0.90967499 0.8084349 0.7770259 0.7386505 0.73802519 0.7236654
0.5484696
## [2,] 0.10952550 0.1183788 0.1478523 0.1243312 0.09588204 0.1114589
0.0890478
## [3,] 0.58782360 0.6972676 0.7164517 0.7094904 0.73871612 0.7228175
0.7180382
## [4,] 0.09345141 0.6263916 0.7540983 0.7178845 0.78014109 0.8260070
0.8466469
##      [,1719]  [,1720]  [,1721]  [,1722]  [,1723]  [,1724]
[,1725]
## [1,] 0.42946425 0.34001913 0.2922803 0.20933611 0.10105904 0.05400528
0.1670570
## [2,] 0.03453837 0.05711677 0.1085230 0.08938624 0.03426393 0.10616923
0.1047762
## [3,] 0.70505464 0.70599829 0.6691786 0.23737425 0.18554103 0.38078506
0.4375455
## [4,] 0.79116137 0.74734755 0.7208265 0.73040765 0.72061688 0.67309736
0.6214822
##      [,1726]  [,1727]  [,1728]  [,1729]  [,1730]  [,1731]
[,1732]
## [1,] 0.1321542 0.28994618 0.452484994 0.44196379 0.3357897 0.2851959
0.4618471
## [2,] 0.1317747 0.06329489 0.002895614 0.03383664 0.1030311 0.1437277
0.1167233
## [3,] 0.2800704 0.12982119 0.447540693 0.73456292 0.6639014 0.6649947
0.6623177
## [4,] 0.5906002 0.61294942 0.664200824 0.67910094 0.6036934 0.5673510
0.4170833
##      [,1733]  [,1734]  [,1735]  [,1736]  [,1737]  [,1738]  [,1739]
## [1,] 0.3644716 0.3464661 0.3673084 0.3722707 0.3451679 0.3046232 0.2769213
## [2,] 0.1205476 0.1663136 0.1770233 0.1303608 0.1405739 0.1640539 0.1400094
## [3,] 0.6944167 0.6956914 0.6114734 0.6190417 0.6307237 0.6342801 0.6369511
## [4,] 0.5452098 0.5698914 0.1482875 0.1806294 0.3365570 0.4115300 0.4134356
##      [,1740]  [,1741]  [,1742]  [,1743]  [,1744]  [,1745]
[,1746]
## [1,] 0.2039844 0.07250439 0.08242533 0.10921940 0.3255964 0.4760489
0.4626457
## [2,] 0.1688560 0.11619330 0.12634439 0.09881047 0.1196024 0.1645830
0.1892086
## [3,] 0.6261203 0.61401130 0.60975397 0.61412122 0.6240675 0.6166958
0.6088335
## [4,] 0.4051042 0.37216066 0.36805286 0.35231485 0.3727368 0.3171738
0.2980066
##      [,1747]  [,1748]  [,1749]  [,1750]  [,1751]  [,1752]
```

```
[,1753]
## [1,] 0.5255411 0.5877509 0.3542000 0.31786572 0.55381820 0.44505743
0.23020285
## [2,] 0.1465590 0.1101541 0.1129552 0.12965413 0.05603508 0.07264461
0.07584487
## [3,] 0.6547665 0.6665941 0.6183470 0.57279335 0.51979645 0.46906844
0.25458025
## [4,] 0.4013201 0.4809836 0.4370082 0.02787317 0.33748525 0.34638299
0.27995996
##      [,1754]      [,1755]      [,1756]      [,1757]      [,1758]      [,1759]
[,1760]
## [1,] 0.38019946 0.67017069 0.8710904 0.6948545 0.6613078 0.5911672
0.5496169
## [2,] 0.05965018 0.06899446 0.1095589 0.1282542 0.1269833 0.1033892
0.1159705
## [3,] 0.56296217 0.67838542 0.6803274 0.6888980 0.6674001 0.6544512
0.6355982
## [4,] 0.34200705 0.41408811 0.3118523 0.3333299 0.3934046 0.3938305
0.3877838
##      [,1761]      [,1762]      [,1763]      [,1764]      [,1765]      [,1766]
[,1767]
## [1,] 0.5776614 0.493665637 0.4321360 0.3498417 0.3011833 0.2992101
0.2847609
## [2,] 0.1302093 0.121720981 0.1099258 0.1221512 0.1452994 0.1814104
0.1524266
## [3,] 0.5965212 0.541590929 0.5638657 0.6753623 0.6486230 0.6628391
0.6782433
## [4,] 0.1519944 0.002707368 0.1258889 0.6982649 0.6614203 0.6402870
0.6469024
##      [,1768]      [,1769]      [,1770]      [,1771]      [,1772]      [,1773]
[,1774]
## [1,] 0.1977925 0.1935726 0.2116210 0.1653468 0.08916390 0.0927942
0.1618932
## [2,] 0.1431101 0.1184852 0.1445544 0.1016552 0.07010495 0.1037248
0.1196566
## [3,] 0.6793816 0.6917323 0.7179753 0.5197619 0.16791492 0.2540232
0.6564136
## [4,] 0.6617625 0.7248894 0.7004099 0.6613018 0.64165716 0.6459911
0.6382404
##      [,1775]      [,1776]      [,1777]      [,1778]      [,1779]      [,1780]
[,1781]
## [1,] 0.1927078 0.1808865 0.32215023 0.5106221 0.4580016 0.45012009
0.5122676
## [2,] 0.1657496 0.1523259 0.07001264 0.1331737 0.1256163 0.09889585
0.1019748
## [3,] 0.7604396 0.4941193 0.20202769 0.2962669 0.6851130 0.69213430
0.7042332
## [4,] 0.6949200 0.6057489 0.62198602 0.6164108 0.6416378 0.53451711
0.5572947
##      [,1782]      [,1783]      [,1784]      [,1785]      [,1786]      [,1787]
```

```
[,1788]
## [1,] 0.51158197 0.4059156 0.39103331 0.33302640 0.3136065 0.2796736
0.2462057
## [2,] 0.06404401 0.1120531 0.09976839 0.10904045 0.1215262 0.1594567
0.1397809
## [3,] 0.69625370 0.6948048 0.61802993 0.60629059 0.6339780 0.6254689
0.6332052
## [4,] 0.58834420 0.6560535 0.23636614 0.09244863 0.3339663 0.3911196
0.4288462
##      [,1789]  [,1790]  [,1791]  [,1792]  [,1793]  [,1794]  [,1795]
## [1,] 0.2016285 0.1728782 0.2436047 0.3100691 0.3308508 0.2392268 0.2095393
## [2,] 0.1290993 0.1436865 0.1464239 0.1248474 0.1629497 0.1263835 0.1040729
## [3,] 0.6260853 0.6293083 0.6293898 0.6299133 0.6232426 0.6192227 0.6137226
## [4,] 0.3863459 0.3910343 0.4310756 0.3968945 0.3954985 0.3231400 0.2900627
##      [,1796]  [,1797]  [,1798]  [,1799]  [,1800]  [,1801]
[,1802]
## [1,] 0.1813958 0.2191688 0.23468316 0.18486839 0.27030812 0.35590654
0.50995402
## [2,] 0.1376004 0.1975929 0.07278569 0.08362007 0.05468462 0.03848844
0.05375037
## [3,] 0.6149726 0.6049772 0.63498626 0.60749890 0.56720881 0.12068757
0.21685984
## [4,] 0.3122711 0.3296756 0.44341175 0.27170762 0.05049260 0.27715498
0.36381990
##      [,1803]  [,1804]  [,1805]  [,1806]  [,1807]  [,1808]
## [1,] 0.36671278 0.47458252 0.655818030 0.79080563 0.73270389 0.71708380
## [2,] 0.03319322 0.02653215 0.002422046 0.05870021 0.09929987 0.08518804
## [3,] 0.12281690 0.49239502 0.694660753 0.71479220 0.68131515 0.66030611
## [4,] 0.33560055 0.34399544 0.425768241 0.30757038 0.28492118 0.37967466
##      [,1809]  [,1810]  [,1811]  [,1812]  [,1813]  [,1814]
[,1815]
## [1,] 0.5740187 0.2717355 0.2732853 0.25859616 0.255571005 0.19513753
0.12645670
## [2,] 0.0858721 0.1224200 0.1647820 0.15283166 0.106380849 0.07416512
0.06979962
## [3,] 0.6660636 0.6152714 0.5772335 0.55044302 0.528582445 0.61639735
0.67502290
## [4,] 0.3369778 0.3453858 0.1275215 0.05702513 0.004965074 0.32074229
0.78607206
##      [,1816]  [,1817]  [,1818]  [,1819]  [,1820]  [,1821]
[,1822]
## [1,] 0.1070106 0.1100579 0.1205016 0.09350946 0.07994907 0.05637414
0.05673068
## [2,] 0.1063586 0.1303082 0.1304829 0.11184620 0.16123579 0.17946646
0.09354972
## [3,] 0.6566956 0.6271844 0.6634670 0.64942053 0.67183075 0.41326524
0.18002047
## [4,] 0.6543917 0.5724838 0.5449211 0.50316217 0.47472136 0.48853579
0.52636403
##      [,1823]  [,1824]  [,1825]  [,1826]  [,1827]  [,1828]
```



```
[,1829]
## [1,] 0.06259938 0.1163363 0.1405388 0.22525269 0.4907068 0.6015740
0.3553011
## [2,] 0.08293816 0.1507164 0.1369604 0.09826683 0.1322161 0.1661719
0.1242208
## [3,] 0.31202017 0.6359710 0.6969837 0.55398563 0.2379764 0.2901163
0.6190807
## [4,] 0.55460416 0.5806381 0.5818363 0.58442047 0.7217257 0.7938122
0.7625835
##      [,1830]      [,1831]      [,1832]      [,1833]      [,1834]      [,1835]
[,1836]
## [1,] 0.4481063 0.58395972 0.48743834 0.1941022 0.2476677 0.1703566
0.1676261
## [2,] 0.0513243 0.01784071 0.08540324 0.1671585 0.1636737 0.1577556
0.1646406
## [3,] 0.7034112 0.66073640 0.68870125 0.5938446 0.5821560 0.6183012
0.6098912
## [4,] 0.4628511 0.33092691 0.47685644 0.2105235 0.0650923 0.3516969
0.3811866
##      [,1837]      [,1838]      [,1839]      [,1840]      [,1841]      [,1842]
[,1843]
## [1,] 0.1544281 0.09908841 0.06584404 0.26430734 0.3069441 0.18347485
0.1578979
## [2,] 0.1977573 0.16307731 0.13646406 0.06141642 0.1237950 0.08151435
0.1129785
## [3,] 0.6284020 0.62045291 0.61786289 0.65061030 0.6393183 0.62830383
0.6038227
## [4,] 0.4350584 0.37016926 0.39337733 0.43809370 0.4304658 0.39085167
0.3327432
##      [,1844]      [,1845]      [,1846]      [,1847]      [,1848]      [,1849]
[,1850]
## [1,] 0.08311061 0.1654704 0.23407316 0.2255332 0.1962174 0.24157899
0.265676614
## [2,] 0.14405590 0.1633039 0.09161927 0.1204838 0.1414828 0.09499825
0.140094981
## [3,] 0.58800965 0.6085232 0.61597966 0.6078290 0.6092505 0.57981157
0.575264563
## [4,] 0.32675312 0.3072095 0.34236494 0.3494335 0.3128382 0.08081532
0.006806325
##      [,1851]      [,1852]      [,1853]      [,1854]      [,1855]      [,1856]
## [1,] 0.60660669 0.64717324 0.38634984 0.51006602 0.39117392 0.70028449
## [2,] 0.09587018 0.09418619 0.06004147 0.03954457 0.03271839 0.03128744
## [3,] 0.13623441 0.23254610 0.13005762 0.37151354 0.68889683 0.67167030
## [4,] 0.34994757 0.41478504 0.34234364 0.33422138 0.42222511 0.41780738
##      [,1857]      [,1858]      [,1859]      [,1860]      [,1861]      [,1862]
## [1,] 0.59773055 0.65412578 0.63477447 0.3023679 0.11797882 0.15875523
## [2,] 0.06040192 0.04444989 0.02097959 0.0444402 0.05063290 0.06694928
## [3,] 0.66865886 0.66584114 0.66142980 0.6118341 0.56375800 0.57885503
## [4,] 0.26147338 0.27666878 0.31919610 0.2365478 0.02391675 0.08926797
##      [,1863]      [,1864]      [,1865]      [,1866]      [,1867]      [,1868]
```

```

## [1,] 0.14305124 0.119863850 0.05291335 0.0885142 0.13518596 0.14644376
## [2,] 0.11360253 0.097338751 0.10438571 0.0350625 0.07969325 0.05112762
## [3,] 0.57800697 0.551945037 0.66568576 0.7377815 0.70430185 0.69949630
## [4,] 0.02066648 0.006453361 0.54045789 0.7919926 0.68262929 0.62312400
##      [,1869]  [,1870]  [,1871]  [,1872]  [,1873]  [,1874]
[,1875]
## [1,] 0.16016969 0.1409978 0.1335087 0.1352692 0.16674782 0.25093346
0.2574183
## [2,] 0.07375513 0.1175531 0.1095677 0.1192687 0.05749644 0.08368937
0.1368758
## [3,] 0.68756667 0.6556909 0.3490994 0.1938032 0.34578622 0.68893959
0.7479701
## [4,] 0.56660883 0.5266229 0.5157957 0.4971901 0.50350289 0.50089052
0.5514527
##      [,1876]  [,1877]  [,1878]  [,1879]  [,1880]  [,1881]
## [1,] 0.18543739 0.55010504 0.53096787 0.16482351 0.36067796 0.61575514
## [2,] 0.07419607 0.04719732 0.05168586 0.06210194 0.06129835 0.08450678
## [3,] 0.65495411 0.28400677 0.30460937 0.44018541 0.66080905 0.60636757
## [4,] 0.70185131 0.79233887 0.88312216 0.62574718 0.09266589 0.04250171
##      [,1882]  [,1883]  [,1884]  [,1885]  [,1886]  [,1887]
## [1,] 0.39536142 0.130441761 0.1658079 0.1014347 0.07643863 0.06312838
## [2,] 0.11345039 0.192961109 0.2084320 0.1640642 0.18221706 0.20006738
## [3,] 0.59672618 0.559226927 0.5924483 0.6333216 0.62189167 0.62223594
## [4,] 0.01865685 0.004364749 0.2251169 0.3787179 0.35305354 0.38436521
##      [,1888]  [,1889]  [,1890]  [,1891]  [,1892]  [,1893]
[,1894]
## [1,] 0.03945686 0.09504671 0.2942762 0.2314261 0.1205418 0.1765872
0.1496120
## [2,] 0.18148430 0.11768203 0.1758902 0.1928847 0.2240836 0.2304170
0.1605251
## [3,] 0.62409271 0.63141726 0.6681590 0.6130699 0.6059030 0.6330608
0.6249039
## [4,] 0.36002942 0.39689263 0.4094792 0.3516889 0.3570058 0.3262865
0.3565312
##      [,1895]  [,1896]  [,1897]  [,1898]  [,1899]  [,1900]
## [1,] 0.1722143 0.1445518 0.1592866 0.24467917 0.281270666 0.274714248
## [2,] 0.1676462 0.1710061 0.1408160 0.16426185 0.142777367 0.146739187
## [3,] 0.6432316 0.6327116 0.6200242 0.58654555 0.534265353 0.559327827
## [4,] 0.3338490 0.3436806 0.2922508 0.02539702 0.004969682 0.002948948
##      [,1901]  [,1902]  [,1903]  [,1904]  [,1905]  [,1906]
[,1907]
## [1,] 0.20359306 0.19076884 0.2078841 0.21990110 0.1865544 0.5774674
0.64280193
## [2,] 0.04640295 0.06631985 0.0537581 0.09851677 0.1336566 0.1064946
0.08887604
## [3,] 0.10565673 0.13329614 0.1071712 0.29900050 0.6496870 0.6636753
0.61578965
## [4,] 0.32271968 0.30774111 0.2888448 0.31079229 0.3954747 0.4753571
0.34281813
##      [,1908]  [,1909]  [,1910]  [,1911]  [,1912]  [,1913]

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## [1,] 0.52501262 0.64719773 0.572190357 0.23895814 0.217908541 0.17303735
## [2,] 0.07141687 0.01527286 0.003795219 0.05589696 0.097050023 0.09176358
## [3,] 0.59865832 0.63823284 0.597294152 0.56148129 0.545230024 0.58284969
## [4,] 0.20059682 0.22652928 0.135653305 0.01331418 0.008475733 0.04838558
##      [,1914]  [,1915]  [,1916]  [,1917]  [,1918]  [,1919]
[,1920]
## [1,] 0.20193621 0.1584752 0.12678706 0.1580954 0.11791388 0.09624633
0.1030764
## [2,] 0.08863359 0.1066754 0.08002546 0.1006787 0.06667832 0.08767451
0.0660031
## [3,] 0.63349862 0.6389020 0.74568560 0.7604669 0.72930096 0.76740316
0.6928404
## [4,] 0.12883439 0.2136858 0.79425866 0.8091272 0.74808961 0.70275304
0.6781826
##      [,1921]  [,1922]  [,1923]  [,1924]  [,1925]  [,1926]
## [1,] 0.09607693 0.07944683 0.08036153 0.13246896 0.08589764 0.10828993
## [2,] 0.07814276 0.09410635 0.05947247 0.05462197 0.05920066 0.06255022
## [3,] 0.31900252 0.19872380 0.42102067 0.76944994 0.71446970 0.73977678
## [4,] 0.60233373 0.58031353 0.60347757 0.69318834 0.81008945 0.84188289
##      [,1927]  [,1928]  [,1929]  [,1930]  [,1931]  [,1932]
## [1,] 0.6149459 0.32116582 0.003165263 0.26429891 0.66932032 0.212155852
## [2,] 0.0399977 0.09866259 0.078606568 0.09177579 0.13460705 0.133529242
## [3,] 0.4109889 0.30267498 0.345515367 0.63065988 0.66623705 0.590867860
## [4,] 0.8633202 0.80211010 0.411490183 0.09378304 0.08192287 0.009160682
##      [,1933]  [,1934]  [,1935]  [,1936]  [,1937]  [,1938]
## [1,] 0.06671332 0.03067647 0.04860596 0.04927484 0.01243924 0.001436839
## [2,] 0.18187716 0.19446206 0.13782756 0.20129722 0.22656492 0.165856143
## [3,] 0.54800090 0.58110844 0.61985701 0.59090304 0.60077497 0.617990388
## [4,] 0.03488585 0.19121372 0.35263533 0.33518994 0.37726806 0.412594410
##      [,1939]  [,1940]  [,1941]  [,1942]  [,1943]  [,1944]
[,1945]
## [1,] 0.009794509 0.02928817 0.01266566 0.09551168 0.2836136 0.2622382
0.1872606
## [2,] 0.080770264 0.13452142 0.14828732 0.13224319 0.1508472 0.1529627
0.1664819
## [3,] 0.615323593 0.60365238 0.56272161 0.59091561 0.6217951 0.6098331
0.6178990
## [4,] 0.366679407 0.28684634 0.24934869 0.31623834 0.3897425 0.3547224
0.3974839
##      [,1946]  [,1947]  [,1948]  [,1949]  [,1950]  [,1951]
## [1,] 0.1583036 0.27945408 0.27974190 0.270028216 0.282404407 0.0560444372
## [2,] 0.1668726 0.19646865 0.16676165 0.166031777 0.091747518 0.0007332929
## [3,] 0.6139838 0.56684654 0.53306381 0.541978431 0.551128099 0.0093858394
## [4,] 0.3358898 0.03169576 0.01124619 0.006732104 0.001535978 0.2871265593
##      [,1952]  [,1953]  [,1954]  [,1955]  [,1956]  [,1957]
## [1,] 0.09851877 0.12473059 0.09371949 0.14301225 0.416000360 0.693286384
## [2,] 0.04423809 0.02304735 0.03507338 0.04564336 0.001644661 0.008312281
## [3,] 0.04088901 0.05808185 0.22398697 0.52804606 0.678852016 0.671513724
## [4,] 0.26174079 0.23325995 0.34142163 0.35740810 0.401585850 0.354583549
##      [,1958]  [,1959]  [,1960]  [,1961]  [,1962]  [,1963]

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[,1964]
## [1,] 0.48204092 0.4895689 0.6310706 0.4939444 0.18366873 0.1850885
0.15141329
## [2,] 0.09204189 0.1502166 0.1048580 0.1080094 0.10256941 0.1054377
0.08887344
## [3,] 0.62128455 0.5977300 0.6187253 0.6147940 0.58506516 0.5838398
0.58382522
## [4,] 0.10334205 0.1116314 0.1613785 0.1885999 0.08278525 0.1836070
0.14647540
##          [,1965]      [,1966]      [,1967]      [,1968]      [,1969]      [,1970]
## [1,] 0.231605081 0.12726488 0.002653397 0.03050252 0.01242242 0.02274543
## [2,] 0.118009000 0.07789159 0.085147943 0.13477294 0.05468227 0.08783481
## [3,] 0.539409734 0.60330980 0.689309107 0.71863559 0.49554387 0.35277300
## [4,] 0.007566212 0.24763875 0.887657009 0.78921554 0.75096597 0.71062712
##          [,1971]      [,1972]      [,1973]      [,1974]      [,1975]      [,1976]
## [1,] 0.01432033 0.01036998 0.01559687 0.0005541574 0.00480464 0.26353170
## [2,] 0.17319481 0.06381795 0.06270032 0.1718677114 0.15210049 0.07037588
## [3,] 0.22833471 0.19365625 0.44102204 0.6255622370 0.59766965 0.62514883
## [4,] 0.66993983 0.67899310 0.75761716 0.8892253518 0.84037964 0.85151644
##          [,1977]      [,1978]      [,1979]      [,1980]      [,1981]      [,1982]
## [1,] 0.78318771 0.1614231 0.00212681 0.2135689 0.64701717 0.14721999
0.01989218
## [2,] 0.09053485 0.1426850 0.14314873 0.1426853 0.12338061 0.11793273
0.13438086
## [3,] 0.41888375 0.1673754 0.08819424 0.3079622 0.53416374 0.60251161
0.53153001
## [4,] 0.85452675 0.3607443 0.18385955 0.3124204 0.02878328 0.01320968
0.02070512
##          [,1984]      [,1985]      [,1986]      [,1987]      [,1988]      [,1989]
## [1,] 0.01020533 0.01923931 0.007032577 0.03423888 0.03355099 0.003879317
## [2,] 0.15020683 0.13539613 0.137555508 0.09800325 0.12714951 0.088164258
## [3,] 0.62400199 0.62227576 0.610613971 0.61846524 0.60848455 0.593330020
## [4,] 0.32982833 0.31539992 0.285197048 0.34604572 0.33251747 0.268435729
##          [,1990]      [,1991]      [,1992]      [,1993]      [,1994]      [,1995]
## [1,] 0.006095494 0.01103311 0.00018685 0.1112394 0.1465653 0.09165197
## [2,] 0.088285178 0.08588051 0.12396733 0.1307876 0.1654711 0.17112968
## [3,] 0.596296916 0.60592110 0.61294583 0.6301402 0.6477511 0.61849492
## [4,] 0.250586444 0.30821483 0.32429506 0.3327536 0.4661006 0.30712770
##          [,1996]      [,1997]      [,1998]      [,1999]      [,2000]
## [1,] 0.037155064 0.157581771 0.246894965 0.41180465 0.6354893725
0.019640335
## [2,] 0.195798297 0.133084273 0.101413967 0.07041931 0.0762494060
0.082899759
## [3,] 0.533789201 0.545553213 0.565673145 0.59458297 0.6047883850
0.008792674
## [4,] 0.004897275 0.001185428 0.002441708 0.01164414 0.0003662388
0.187449673
##          [,2002]      [,2003]      [,2004]      [,2005]      [,2006]      [,2007]

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```
## [1,] 0.018460095 0.006626479 0.003170142 0.07215536 0.2231234 0.68977488
## [2,] 0.082645420 0.021527873 0.021481584 0.09903713 0.1163197 0.03760976
## [3,] 0.007351618 0.014696423 0.046310956 0.12860372 0.5055856 0.71801357
## [4,] 0.233424832 0.215674247 0.271083356 0.23191187 0.3553364 0.29931830
##      [,2008]      [,2009]      [,2010]      [,2011]      [,2012]      [,2013]
[ ,2014]
## [1,] 0.56650819 0.32942088 0.7787523 0.8553377 0.4071521 0.1034319
0.13019769
## [2,] 0.09211146 0.11738034 0.1385306 0.1653056 0.1623068 0.1682719
0.15673715
## [3,] 0.60138991 0.59538653 0.6628315 0.6856145 0.6095373 0.5613262
0.57879785
## [4,] 0.11683916 0.06084079 0.2867976 0.2569648 0.1334105 0.0437124
0.01768183
##      [,2015]      [,2016]      [,2017]      [,2018]      [,2019]      [,2020]
## [1,] 0.17738456 0.173587724 0.1566436 0.2411644 0.1964496 0.01316644
## [2,] 0.21307354 0.194166082 0.1323671 0.1042605 0.1268507 0.11387268
## [3,] 0.55540541 0.560497976 0.6316388 0.7416078 0.4232370 0.24737311
## [4,] 0.05521453 0.009917507 0.4589530 0.9495084 0.8535262 0.80906966
##      [,2021]      [,2022]      [,2023]      [,2024]      [,2025]      [,2026]
## [1,] 0.009582187 0.005689129 0.0135250 0.005308788 0.005808768 0.5605660
## [2,] 0.164397337 0.138118460 0.1063352 0.112971787 0.142258324 0.1750913
## [3,] 0.267624770 0.292751365 0.3176766 0.348631253 0.300438555 0.3517129
## [4,] 0.842110396 0.759279201 0.7975834 0.745355622 0.608041839 0.5457957
##      [,2027]      [,2028]      [,2029]      [,2030]      [,2031]      [,2032]
## [1,] 0.8306297 0.063855138 0.004887006 0.2216796 0.6941908 0.1802710774
## [2,] 0.1686773 0.154759882 0.166045726 0.1560442 0.1529570 0.0488169738
## [3,] 0.2899516 0.134074907 0.097038498 0.1204253 0.5426907 0.5896317684
## [4,] 0.3450934 0.006196401 0.001917816 0.2524415 0.1112704 0.0009108628
##      [,2033]      [,2034]      [,2035]      [,2036]      [,2037]      [,2038]
## [1,] 0.0441161551 0.1129205 0.13921157 0.1831768 0.13817857 0.09619760
## [2,] 0.1614430888 0.1516799 0.09855816 0.0393063 0.04881316 0.07608776
## [3,] 0.5403105424 0.6197879 0.63642064 0.6478251 0.67064498 0.63767372
## [4,] 0.0008003253 0.2322066 0.34630969 0.3145262 0.32215083 0.29786976
##      [,2039]      [,2040]      [,2041]      [,2042]      [,2043]      [,2044]
## [1,] 0.09714084 0.07486841 0.07000550 0.002102682 0.01073178 0.07716269
## [2,] 0.06800686 0.06621833 0.08965678 0.050434923 0.11741493 0.15349643
## [3,] 0.65354796 0.64596776 0.62902463 0.646609088 0.64890381 0.58448451
## [4,] 0.24099462 0.29086729 0.30354916 0.352405684 0.37708460 0.27102321
##      [,2045]      [,2046]      [,2047]      [,2048]      [,2049]
[ ,2050]
## [1,] 0.129860557 0.0841993267 0.196459858 0.40352056 0.6348696428
0.698679892
## [2,] 0.140604299 0.0683958592 0.001365800 0.02225503 0.0722200237
0.015134517
## [3,] 0.614408734 0.4287124446 0.300557710 0.26656256 0.2676743364
0.379205799
## [4,] 0.008813698 0.0008835453 0.004362697 0.01365618 0.0007458945
0.006033876
##      [,2051]      [,2052]      [,2053]      [,2054]      [,2055]      [,2056]
```

```
## [1,] 0.08822986 0.143058379 0.159405804 0.20404871 0.217255220 0.3091132
## [2,] 0.01668729 0.046858479 0.062028697 0.05239825 0.110627323 0.1415047
## [3,] 0.01368656 0.009179214 0.006969989 0.01087928 0.006329498 0.1427919
## [4,] 0.15880939 0.241904005 0.289600838 0.22793786 0.250743529 0.3175486
##      [,2057]      [,2058]      [,2059]      [,2060]      [,2061]      [,2062]      [,2063]
## [1,] 0.5230272 0.4362448 0.5057234 0.6137441 0.6938235 0.5566321 0.4924948
## [2,] 0.1352468 0.1410586 0.1449993 0.1388644 0.1506108 0.1371477 0.1839406
## [3,] 0.4323012 0.6315305 0.6514606 0.7198657 0.7098262 0.6608775 0.6502059
## [4,] 0.2487288 0.2017806 0.3064407 0.4141740 0.3718887 0.2879818 0.2767641
##      [,2064]      [,2065]      [,2066]      [,2067]      [,2068]      [,2069]
##      [,2070]
## [1,] 0.5404622 0.5001226 0.5045674 0.5996299 0.5195111 0.41943307
0.32700978
## [2,] 0.2293108 0.2332503 0.1587909 0.0959602 0.1014615 0.09448883
0.04508284
## [3,] 0.6231132 0.6390306 0.6454348 0.6394953 0.6938448 0.64020555
0.41688537
## [4,] 0.2638281 0.2739360 0.1961926 0.1165240 0.6254482 1.02487782
0.89590707
##      [,2071]      [,2072]      [,2073]      [,2074]      [,2075]
##      [,2076]
## [1,] 0.287352689 0.2260855595 0.151065104 0.003791866 0.119411338
0.80693851
## [2,] 0.003051406 0.0009979455 0.009218275 0.005967741 0.006892361
0.00816871
## [3,] 0.484199408 0.3903801947 0.309529508 0.230065832 0.244153938
0.25487850
## [4,] 0.837234527 0.7362279178 0.531078993 0.244788278 0.085800481
0.10843649
##      [,2077]      [,2078]      [,2079]      [,2080]      [,2081]
##      [,2082]
## [1,] 0.677929939 0.0039208726 0.003479644 0.3983911727 0.81738026
0.282759248
## [2,] 0.002199136 0.0005005159 0.009692802 0.0006447257 0.02574092
0.005003019
## [3,] 0.301233904 0.2658117184 0.233277309 0.3079276433 0.60482035
0.624624179
## [4,] 0.108695728 0.0094107061 0.011191662 0.0690862664 0.19952656
0.037093736
##      [,2083]      [,2084]      [,2085]      [,2086]      [,2087]      [,2088]
## [1,] 0.157841946 0.2379759 0.28771728 0.3197482 0.32932659 0.25352145
## [2,] 0.004375653 0.0108279 0.00341835 0.0196295 0.04400735 0.05294119
## [3,] 0.623620935 0.6369718 0.65149414 0.6790642 0.66311311 0.62274762
## [4,] 0.007633658 0.2845572 0.28319484 0.3017469 0.31775860 0.21561295
##      [,2089]      [,2090]      [,2091]      [,2092]      [,2093]      [,2094]
## [1,] 0.19447585 0.2947676087 0.19834682 0.160367489 0.263778626 0.32934403
## [2,] 0.02886596 0.0002323098 0.00921297 0.001675831 0.001000725 0.05673590
## [3,] 0.63727231 0.6741731457 0.68318490 0.637415018 0.567659210 0.60432543
## [4,] 0.24475492 0.3008438696 0.35846085 0.318145128 0.149271628 0.02704204
##      [,2095]      [,2096]      [,2097]      [,2098]      [,2099]
```

```

[,2100]
## [1,] 0.213322079 0.196645530 0.415015941 0.551266522 5.736165e-01
0.582859881
## [2,] 0.075186014 0.061260044 0.023342851 0.044791069 1.591738e-02
0.027918570
## [3,] 0.475317876 0.071911317 0.010606986 0.052452085 1.647439e-05
0.009478997
## [4,] 0.005077444 0.007684452 0.006249712 0.004345485 8.213354e-03
0.024703582
##          [,2101]      [,2102]      [,2103]      [,2104]      [,2105]
[,2106]
## [1,] 0.462765648 0.456110886 0.32787624 0.37650977 0.4871589741
0.477182973
## [2,] 0.036081947 0.060566055 0.08929155 0.11960400 0.1295237317
0.095784482
## [3,] 0.009733753 0.007874694 0.01649265 0.02488134 0.0009524453
0.007694031
## [4,] 0.216576289 0.240151569 0.31868624 0.24069620 0.1944513620
0.170377202
##          [,2107]      [,2108]      [,2109]      [,2110]      [,2111]      [,2112]
## [1,] 0.3795084 0.21858173 0.4430160 0.51373282 0.43390414 0.502957585
## [2,] 0.1284476 0.08407465 0.1022219 0.01706055 0.00765378 0.003701105
## [3,] 0.0576214 0.20493808 0.3687461 0.47457819 0.53379029 0.643038378
## [4,] 0.2007648 0.28635055 0.3628570 0.38982042 0.33287832 0.340039092
##          [,2113]      [,2114]      [,2115]      [,2116]      [,2117]      [,2118]
[,2119]
## [1,] 0.71485912 0.7471792 0.7373817 0.7761819 0.71969640 0.64982766
0.52048714
## [2,] 0.08977917 0.1256932 0.1696734 0.1337768 0.08790861 0.04502053
0.01113262
## [3,] 0.71565867 0.6796982 0.6640036 0.6845258 0.63861770 0.71194930
0.55478002
## [4,] 0.36153131 0.3286123 0.3074474 0.2732883 0.23656484 0.28001745
0.84231580
##          [,2120]      [,2121]      [,2122]      [,2123]      [,2124]
[,2125]
## [1,] 0.49314737 0.425711856 0.431807736 0.474286198 0.448887982
0.402035304
## [2,] 0.01557936 0.003893555 0.007887224 0.000428222 0.007330519
0.003936965
## [3,] 0.48820056 0.399062720 0.309115427 0.353391998 0.373321484
0.358276742
## [4,] 0.83773924 0.500738056 0.288735567 0.151450535 0.089620998
0.099252761
##          [,2126]      [,2127]      [,2128]      [,2129]      [,2130]      [,2131]
## [1,] 0.5958077 0.544253762 0.22104549 0.220155374 0.343634924 0.53653113
## [2,] 0.0001550 0.003074835 0.01367411 0.003151879 0.004307193 0.03238018
## [3,] 0.4086446 0.282432798 0.31956068 0.411570707 0.348543170 0.55073030
## [4,] 0.1742160 0.154791163 0.22350712 0.223250578 0.125191030 0.14126896
##          [,2132]      [,2133]      [,2134]      [,2135]      [,2136]      [,2137]

```

```
## [1,] 0.5097443 0.31562089 0.34871960 0.43142642 0.37996873 0.36629571
## [2,] 0.1032423 0.05375119 0.08595197 0.02944812 0.02699664 0.01503644
## [3,] 0.6874543 0.61290209 0.63137359 0.64668221 0.64142744 0.64396709
## [4,] 0.1550249 0.00540523 0.19822927 0.29733431 0.26599662 0.25398788
##      [,2138]      [,2139]      [,2140]      [,2141]      [,2142]      [,2143]
## [1,] 0.37952274 0.37975125 0.34085133 0.37518484 0.37876481 0.4168333683
## [2,] 0.04744049 0.05511477 0.03638508 0.05146633 0.05508265 0.0004952318
## [3,] 0.65487605 0.67505649 0.65177217 0.58052863 0.30613136 0.0618887015
## [4,] 0.28704586 0.29388027 0.21701943 0.18117993 0.13005348 0.0389726742
##      [,2144]      [,2145]      [,2146]      [,2147]      [,2148]      [,2149]
## [1,] 0.447947153 0.456860033 0.46759445 0.632957477 0.666899963 0.66817245
## [2,] 0.005176033 0.010469974 0.04220279 0.081605729 0.083824300 0.07921196
## [3,] 0.099563569 0.154531256 0.01342428 0.007441417 0.002029905 0.01413300
## [4,] 0.024835759 0.007465999 0.01041810 0.012941901 0.003149023 0.01329561
##      [,2150]      [,2151]      [,2152]      [,2153]      [,2154]      [,2155]
## [1,] 0.5822436129 0.527572098 0.51613395 0.46676164 0.4586004 0.49507859
## [2,] 0.0836962602 0.004648861 0.06514666 0.06973130 0.1069006 0.06239712
## [3,] 0.0009330521 0.015655578 0.01171633 0.02882911 0.0246680 0.01153484
## [4,] 0.0023899430 0.242036733 0.18344291 0.26337663 0.2478024 0.13923857
##      [,2156]      [,2157]      [,2158]      [,2159]      [,2160]      [,2161]
## [1,] 0.58212973 0.60288641 0.23641681 0.009271408 0.561660020 0.548655146
## [2,] 0.01601961 0.07313379 0.07997895 0.047289158 0.009186842 0.008359836
## [3,] 0.01283398 0.04703635 0.03287083 0.016685008 0.074860439 0.124735073
## [4,] 0.16706429 0.28878215 0.30483828 0.269458862 0.353427807 0.364775400
##      [,2162]      [,2163]      [,2164]      [,2165]      [,2166]      [,2167]
##      [,2168]
## [1,] 0.21931328 0.49575196 0.92284230 0.9141579 0.8089688 0.8484428
0.8577353
## [2,] 0.04958646 0.05682777 0.09462161 0.1507273 0.1336835 0.1940502
0.1505912
## [3,] 0.27667904 0.57512689 0.69755422 0.7036490 0.6415701 0.6446929
0.5232891
## [4,] 0.32089241 0.32068145 0.36780775 0.3596213 0.3577227 0.3926951
0.3237775
##      [,2169]      [,2170]      [,2171]      [,2172]      [,2173]      [,2174]
##      [,2175]
## [1,] 0.7580381 0.74858228 0.67137206 0.67537117 0.6668708 0.71114373
0.63423653
## [2,] 0.1142607 0.08470489 0.08195181 0.09555656 0.1250719 0.07275934
0.08478276
## [3,] 0.2998544 0.40997858 0.45453178 0.36815345 0.3088180 0.37545294
0.32923324
## [4,] 0.5299977 0.52490180 0.23187627 0.21847560 0.1985309 0.18633678
0.19316063
##      [,2176]      [,2177]      [,2178]      [,2179]      [,2180]      [,2181]
##      [,2182]
## [1,] 0.50549047 0.57074701 0.53366904 0.4649886 0.4006651 0.3222479
0.70598673
## [2,] 0.03998129 0.04422095 0.03979786 0.1094069 0.1420479 0.1209692
0.05806699
```



```
## [3,] 0.32240796 0.36107278 0.35555828 0.4062269 0.2946538 0.3091305
0.73794808
## [4,] 0.21703478 0.21987194 0.29403898 0.3091852 0.3720629 0.3375697
0.35801297
##      [,2183]      [,2184]      [,2185]      [,2186]      [,2187]      [,2188]
[,2189]
## [1,] 0.6282679 0.55198571 0.5767859 0.56849477 0.5392665 0.5307447
0.5269690
## [2,] 0.1105176 0.13604850 0.0785761 0.09319677 0.1253515 0.1391262
0.1645050
## [3,] 0.7002779 0.62543138 0.6374870 0.67867616 0.6868112 0.5704649
0.3366919
## [4,] 0.1337652 0.07008133 0.1643353 0.20084162 0.2087544 0.2091941
0.1835417
##      [,2190]      [,2191]      [,2192]      [,2193]      [,2194]      [,2195]
## [1,] 0.3846842 0.3439098 0.505573954 0.56466265 0.61375118 0.74236492
## [2,] 0.1432507 0.1507520 0.181074323 0.18089262 0.17446736 0.18378861
## [3,] 0.1773534 0.1003389 0.003921902 0.00681245 0.01020261 0.00172088
## [4,] 0.1054723 0.1117209 0.083622424 0.11482249 0.12082855 0.02780528
##      [,2196]      [,2197]      [,2198]      [,2199]      [,2200]
[,2201]
## [1,] 0.778495845 0.806081693 0.866005975 0.846931984 0.85696972
0.515950443
## [2,] 0.181779005 0.216062775 0.144851159 0.111905178 0.17751694
0.012869271
## [3,] 0.009508114 0.011050142 0.008875879 0.005219779 0.01330957
0.004820423
## [4,] 0.002424196 0.001418067 0.016777118 0.027639579 0.02392478
0.218323064
##      [,2202]      [,2203]      [,2204]      [,2205]      [,2206]      [,2207]
## [1,] 0.551197495 0.61314920 0.64603288 0.67681345 0.72910073 0.75533663
## [2,] 0.046676452 0.08437725 0.08418028 0.08902943 0.04503494 0.11929977
## [3,] 0.005684125 0.02010743 0.02797731 0.02537613 0.05019312 0.07432248
## [4,] 0.193240327 0.21354675 0.20652220 0.07278962 0.19865180 0.36907286
##      [,2208]      [,2209]      [,2210]      [,2211]      [,2212]      [,2213]
## [1,] 0.40613884 0.34582856 0.61374675 0.46358171 0.148530054 0.2451810
## [2,] 0.13620448 0.17526076 0.18924728 0.21153810 0.174862357 0.1133259
## [3,] 0.03075911 0.01291346 0.08617517 0.07225057 0.003127687 0.1145581
## [4,] 0.32810156 0.32402496 0.32853144 0.31556654 0.255237113 0.2770762
##      [,2214]      [,2215]      [,2216]      [,2217]      [,2218]      [,2219]
[,2220]
## [1,] 0.6119179 0.8197256 0.8741591 0.9142165 0.9391789 0.8355117
0.79485096
## [2,] 0.1200512 0.1616622 0.2166273 0.1215288 0.1161696 0.1177761
0.09390157
## [3,] 0.2766948 0.5350890 0.6921618 0.6751373 0.4114394 0.2066811
0.39051590
## [4,] 0.3462272 0.3732127 0.3666554 0.3303646 0.3221392 0.2809600
0.32299916
##      [,2221]      [,2222]      [,2223]      [,2224]      [,2225]      [,2226]
```

```

[,2227]
## [1,] 0.75688029 0.83454406 0.8102061 0.7804045 0.87992347 0.55721737
0.40980216
## [2,] 0.06173521 0.06646113 0.1072216 0.1154686 0.08811144 0.08220144
0.06309171
## [3,] 0.31559322 0.26699602 0.4740326 0.5477800 0.58203523 0.47335267
0.26139848
## [4,] 0.26718250 0.24005739 0.2345889 0.2198602 0.27179976 0.14322825
0.20766763
##      [,2228]      [,2229]      [,2230]      [,2231]      [,2232]      [,2233]
[,2234]
## [1,] 0.62657826 0.71052948 0.6709252 0.2275274 0.3655073 0.6863434
0.7804558
## [2,] 0.03836497 0.09067976 0.1116326 0.1017896 0.0531892 0.0763453
0.0816938
## [3,] 0.23481612 0.40966782 0.2969605 0.1675615 0.4576382 0.7330984
0.6942584
## [4,] 0.22832539 0.33742388 0.4073998 0.3893346 0.2769863 0.2792906
0.2222016
##      [,2235]      [,2236]      [,2237]      [,2238]      [,2239]      [,2240]
## [1,] 0.75037554 0.67349456 0.6577556 0.57782490 0.603155120 0.554418837
## [2,] 0.04702407 0.09831130 0.1136109 0.09398623 0.098246921 0.090438995
## [3,] 0.71619176 0.67314329 0.4533599 0.12721957 0.000760043 0.004543485
## [4,] 0.08861748 0.08406003 0.1569028 0.15237418 0.142808211 0.134266943
##      [,2241]      [,2242]      [,2243]      [,2244]      [,2245]      [,2246]
## [1,] 0.65671411 0.770044646 0.80847874 0.838936762 0.929120586 0.972526809
## [2,] 0.07823187 0.118802798 0.17380625 0.152076342 0.194700424 0.208550036
## [3,] 0.02724586 0.000886901 0.01984919 0.004295772 0.001134845 0.001220464
## [4,] 0.16881011 0.168410879 0.15203928 0.124505635 0.100734199 0.002028134
##      [,2247]      [,2248]      [,2249]      [,2250]      [,2251]
[,2252]
## [1,] 0.960939610 0.908954078 1.05500945 1.0726997037 0.734243701
0.82483961
## [2,] 0.132123800 0.154843576 0.17181704 0.1391099462 0.120701400
0.11673628
## [3,] 0.004294511 0.017098221 0.06566591 0.0006617737 0.001307976
0.01056085
## [4,] 0.001376998 0.007786657 0.04332455 0.0181304022 0.196068485
0.18444124
##      [,2253]      [,2254]      [,2255]      [,2256]      [,2257]      [,2258]
## [1,] 0.92394157 0.86164836 0.89547137 0.84602609 0.8536270 0.83257761
## [2,] 0.07024319 0.10003577 0.15210232 0.11555722 0.1203525 0.14189316
## [3,] 0.03888341 0.03060868 0.04964547 0.07738178 0.1027776 0.06579977
## [4,] 0.16757251 0.23519261 0.20723276 0.29231146 0.2923350 0.32669568
##      [,2259]      [,2260]      [,2261]      [,2262]      [,2263]      [,2264]
## [1,] 0.81975088 0.84914399 0.76344621 0.73596146 0.6827993 0.655766161
## [2,] 0.20059895 0.14135697 0.16069276 0.23604590 0.2182548 0.186411982
## [3,] 0.03195009 0.07695242 0.06274316 0.07015349 0.0792249 0.005856675
## [4,] 0.33878396 0.32140367 0.30404371 0.31649412 0.3287604 0.330459328
##      [,2265]      [,2266]      [,2267]      [,2268]      [,2269]      [,2270]      [,2271]

```

```
## [1,] 0.7937621 0.8431350 0.8679757 0.8334313 0.7332058 0.7346342 0.8028657
## [2,] 0.1591013 0.1995246 0.2152262 0.2246241 0.2390216 0.2292662 0.1831003
## [3,] 0.1583061 0.3804155 0.4609287 0.3163968 0.3253850 0.2294159 0.4615062
## [4,] 0.3771221 0.3731462 0.3743525 0.3609826 0.2961723 0.2124522 0.2195354
##      [,2272] [,2273] [,2274] [,2275] [,2276] [,2277] [,2278]
## [1,] 0.9461351 0.9380830 0.8705095 0.8317606 0.3915014 0.2126958 0.5565358
## [2,] 0.1599521 0.1457796 0.1629531 0.1515000 0.1399920 0.1509480 0.1799586
## [3,] 0.7774240 0.7335923 0.6642666 0.5496264 0.6316323 0.7248247 0.7166820
## [4,] 0.2034456 0.3200210 0.3369677 0.3058599 0.2131326 0.1647937 0.2794030
##      [,2279] [,2280] [,2281] [,2282] [,2283] [,2284]
##      [,2285]
## [1,] 0.8261820 0.81948867 0.2243270 0.1034044 0.5685637 0.9469150
0.9815791
## [2,] 0.1286041 0.08862491 0.1278194 0.1671255 0.1581257 0.1738679
0.1486373
## [3,] 0.2092776 0.32859572 0.2123670 0.2868570 0.5510261 0.4359643
0.4024424
## [4,] 0.3587434 0.31571898 0.2256428 0.1808341 0.3200401 0.3195488
0.2019324
##      [,2286] [,2287] [,2288] [,2289] [,2290] [,2291]
## [1,] 0.83144332 0.78843041 0.801110219 0.849710822 0.79836358 0.73774671
## [2,] 0.10246198 0.07653038 0.090071372 0.131766952 0.12932504 0.11273087
## [3,] 0.34416028 0.10793327 0.002318104 0.005599899 0.02623153 0.05465867
## [4,] 0.04844611 0.07140777 0.119003313 0.215767897 0.15909696 0.16467443
##      [,2292] [,2293] [,2294] [,2295] [,2296] [,2297]
## [1,] 0.82306147 0.89820548 0.97049312 1.05062492 1.09475003 1.11605410
## [2,] 0.12058940 0.08499980 0.06169243 0.08644079 0.11452235 0.09258336
## [3,] 0.01759363 0.02581579 0.06317778 0.07290512 0.01002322 0.05218605
## [4,] 0.16185598 0.19632779 0.18318989 0.13732251 0.04140386 0.04348330
##      [,2298] [,2299] [,2300] [,2301] [,2302] [,2303]
## [1,] 1.08129419 1.16824534 1.1260950959 0.998240942 0.96472017 1.00849155
## [2,] 0.11107117 0.12879191 0.0931416808 0.109711945 0.14010287 0.10005110
## [3,] 0.07901970 0.04771757 0.0007101969 0.004817266 0.01451658 0.03840411
## [4,] 0.02554421 0.06580674 0.0504021206 0.111881776 0.08724431 0.11527234
##      [,2304] [,2305] [,2306] [,2307] [,2308] [,2309]
## [1,] 0.914619136 0.887031972 0.92070549 0.90622450 0.91463519 0.87106520
## [2,] 0.091012883 0.127899827 0.10926498 0.12549745 0.15824793 0.12471898
## [3,] 0.008430536 0.005103366 0.06007744 0.08437388 0.06770796 0.05507142
## [4,] 0.252803266 0.347299057 0.38837684 0.31596213 0.32812250 0.34569488
##      [,2310] [,2311] [,2312] [,2313] [,2314] [,2315]
## [1,] 0.88670774 0.93211468 0.89855777 0.94009693 0.9353672 0.86601433
## [2,] 0.09071159 0.05425193 0.03271108 0.08508713 0.1685930 0.12436379
## [3,] 0.08202859 0.07791916 0.04484862 0.10486289 0.1182217 0.09891506
## [4,] 0.36293959 0.37015692 0.39507614 0.41929997 0.4232470 0.43977591
##      [,2316] [,2317] [,2318] [,2319] [,2320] [,2321]
##      [,2322]
## [1,] 0.81837027 0.9705496 0.9183517 0.8861129 0.9144247 1.0007614
0.9743630
## [2,] 0.06366366 0.1380820 0.1754858 0.1430223 0.1644810 0.1374423
0.1162594
```

```
## [3,] 0.06855410 0.1736414 0.1684554 0.2409756 0.2547808 0.8973855
0.8761812
## [4,] 0.41167112 0.3176034 0.2752038 0.2597218 0.1833165 0.2275747
0.3152505
##      [,2323]      [,2324]      [,2325]      [,2326]      [,2327]      [,2328]
[,2329]
## [1,] 0.93580993 0.92200339 0.93178410 0.85895731 0.9041285 0.9042354
0.9340413
## [2,] 0.06100073 0.08077232 0.09150035 0.09179767 0.1433036 0.1554343
0.1659831
## [3,] 0.42387708 0.26933984 0.23054578 0.27291407 0.8142171 1.1312446
0.6196435
## [4,] 0.38476984 0.34899562 0.23343093 0.27514397 0.2829524 0.3656349
0.3057465
##      [,2330]      [,2331]      [,2332]      [,2333]      [,2334]      [,2335]
[,2336]
## [1,] 0.8642018 0.7223879 0.6673394 0.7922140 0.99473414 1.00536591
0.96349618
## [2,] 0.1293169 0.1341829 0.1275426 0.1311636 0.16326346 0.14586157
0.07467017
## [3,] 0.2462693 0.2163408 0.2365314 0.2086263 0.07573809 0.07190632
0.06718978
## [4,] 0.2787886 0.2917386 0.3012443 0.3535141 0.22441571 0.23439417
0.20909380
##      [,2337]      [,2338]      [,2339]      [,2340]      [,2341]      [,2342]
## [1,] 0.897932221 0.968430006 1.041217164 0.994463832 0.89480987 0.9750702
## [2,] 0.127356893 0.184151095 0.215788392 0.162491800 0.19845033 0.1559898
## [3,] 0.004819141 0.005453621 0.004815768 0.005125843 0.03878495 0.0134812
## [4,] 0.047920641 0.094660334 0.171722957 0.231786566 0.20706656 0.2067497
##      [,2343]      [,2344]      [,2345]      [,2346]      [,2347]      [,2348]
## [1,] 1.02395555 1.07508815 1.06639389 1.046566062 1.067887608 1.112832543
## [2,] 0.07596997 0.02951930 0.02024389 0.007860641 0.001138372 0.002921628
## [3,] 0.01704454 0.04803305 0.03655970 0.001379653 0.065400042 0.094519633
## [4,] 0.22666090 0.22325898 0.15252626 0.021270435 0.049728998 0.021207820
##      [,2349]      [,2350]      [,2351]      [,2352]      [,2353]      [,2354]
## [1,] 1.116933169 1.09280457 1.018033052 0.965160467 0.93831056 1.018187191
## [2,] 0.004012576 0.05445374 0.061301370 0.045915445 0.04531689 0.039178192
## [3,] 0.067624984 0.00133980 0.002043396 0.006422111 0.01322296 0.009357947
## [4,] 0.033091431 0.03511940 0.111462536 0.063054499 0.18146320 0.171446141
##      [,2355]      [,2356]      [,2357]      [,2358]      [,2359]      [,2360]
## [1,] 0.95036764 0.93380095 0.92183831 0.97845584 0.95107092 0.959672977
## [2,] 0.05126645 0.07223168 0.05182687 0.04742979 0.02506238 0.004820919
## [3,] 0.00701721 0.01087512 0.03693223 0.09975627 0.06672980 0.095362877
## [4,] 0.15150226 0.27113975 0.37510747 0.41090621 0.41195530 0.446674352
##      [,2361]      [,2362]      [,2363]      [,2364]      [,2365]      [,2366]
## [1,] 0.95055415 0.982184383 0.946831859 0.93018424 0.99333088 0.986555691
## [2,] 0.01449024 0.001022771 0.005368484 0.06638647 0.01715053 0.006622974
## [3,] 0.09457754 0.045903228 0.071687902 0.06480729 0.09311319 0.110616758
## [4,] 0.41041970 0.424430317 0.425731174 0.38621403 0.36016301 0.313306953
##      [,2367]      [,2368]      [,2369]      [,2370]      [,2371]      [,2372]
```

```
[,2373]
## [1,] 1.050031505 1.08505856 1.12793367 1.1502096 1.2866000 1.2427162
1.2070206
## [2,] 0.003709819 0.04180352 0.06520855 0.1196753 0.1330309 0.1423056
0.1013077
## [3,] 0.077345208 0.00499843 0.07587455 0.3734774 0.8519118 0.8920375
0.5800223
## [4,] 0.304033698 0.26306838 0.21312053 0.2305089 0.3288679 0.4290485
0.3908414
##      [,2374]      [,2375]      [,2376]      [,2377]      [,2378]      [,2379]      [,2380]
## [1,] 1.1466050 1.1280322 1.1792634 1.2470945 1.2840085 1.1509324 1.0799855
## [2,] 0.1541471 0.1245534 0.1356070 0.1635881 0.1851178 0.1799855 0.1195522
## [3,] 0.5666109 0.6086176 0.5461513 0.9297479 1.0645785 0.6703785 0.2758180
## [4,] 0.3804871 0.3192429 0.3186332 0.3833072 0.3692072 0.3490463 0.3332534
##      [,2381]      [,2382]      [,2383]      [,2384]      [,2385]      [,2386]
## [1,] 1.13808507 1.13906015 1.11982138 1.03939372 1.02310142 1.10864292
## [2,] 0.09195816 0.09451036 0.07847176 0.06188475 0.10165087 0.07803462
## [3,] 0.14239037 0.09790617 0.07387136 0.05576795 0.03176932 0.07627683
## [4,] 0.36594549 0.34018193 0.32341733 0.22414661 0.18615383 0.23297920
##      [,2387]      [,2388]      [,2389]      [,2390]      [,2391]      [,2392]
## [1,] 1.07592525 1.099851310 1.09461934 1.08756211 1.13062323 1.0872793
## [2,] 0.10172818 0.053380030 0.05900808 0.10377150 0.14341848 0.1420197
## [3,] 0.03841004 0.007670203 0.00491837 0.04452873 0.06947682 0.0658968
## [4,] 0.17891377 0.110085068 0.15871915 0.23871782 0.29005359 0.3180486
##      [,2393]      [,2394]      [,2395]      [,2396]      [,2397]      [,2398]
## [1,] 1.05561434 1.09851064 1.07364764 1.050534558 1.12507589 1.077740180
## [2,] 0.04472789 0.02571386 0.04181271 0.007728741 0.02217486 0.003173474
## [3,] 0.07461155 0.09002974 0.09568566 0.001660809 0.00611746 0.058072940
## [4,] 0.30244671 0.32426919 0.41026216 0.226979157 0.05846021 0.045536750
##      [,2399]      [,2400]      [,2401]      [,2402]      [,2403]
## [1,] 1.015590251 0.960476542 0.977452261 1.0154383301 1.01238094
1.045063696
## [2,] 0.006978778 0.007976386 0.002159642 0.0002366701 0.01255183
0.001155753
## [3,] 0.069194804 0.008771772 0.012660371 0.0050266406 0.01062793
0.003180829
## [4,] 0.029151666 0.032854254 0.075830662 0.1295782983 0.23027993
0.039340008
##      [,2405]      [,2406]      [,2407]      [,2408]      [,2409]      [,2410]
## [1,] 1.051891729 1.064819994 1.044581864 1.10468736 1.07837174 1.05126118
## [2,] 0.022322834 0.028259105 0.048450813 0.07665727 0.04747138 0.07513948
## [3,] 0.006929149 0.008035044 0.001839583 0.04091319 0.04572888 0.15795347
## [4,] 0.001549943 0.051108841 0.117630366 0.18311580 0.27442993 0.41261318
##      [,2411]      [,2412]      [,2413]      [,2414]      [,2415]      [,2416]
## [1,] 0.99907603 1.02566950 1.07231735 1.03565426 1.07462317 1.07656372
## [2,] 0.04569472 0.08657814 0.09620463 0.05078555 0.05472988 0.07181808
## [3,] 0.07134915 0.06966824 0.13629251 0.04545564 0.05662026 0.04954085
## [4,] 0.46333537 0.47338211 0.40750371 0.36036240 0.31503782 0.29986723
##      [,2417]      [,2418]      [,2419]      [,2420]      [,2421]      [,2422]
```

```

## [1,] 1.10698880 1.05044763 1.0527761 1.08966735 1.12603071 1.10095833
## [2,] 0.10316050 0.06170685 0.0578981 0.06559942 0.05716078 0.06543772
## [3,] 0.08032748 0.07815954 0.1144259 0.16658867 0.56851738 0.73674643
## [4,] 0.23425122 0.15914409 0.1880422 0.28354272 0.39479682 0.39909415
##      [,2423]      [,2424]      [,2425]      [,2426]      [,2427]      [,2428]
## [1,] 1.17580519 1.20489782 1.21541904 1.24681402 1.23622326 1.21697807
## [2,] 0.07605805 0.06217773 0.06860963 0.03791636 0.01133624 0.07673457
## [3,] 0.62758879 0.64152111 0.70268442 0.68067876 0.79817370 0.89122126
## [4,] 0.40285278 0.37910435 0.34371081 0.35569231 0.36969574 0.40731251
##      [,2429]      [,2430]      [,2431]      [,2432]      [,2433]      [,2434]
## [1,] 1.14633706 1.054476070 1.10038013 1.12032515 1.10249963 1.084298331
## [2,] 0.06131268 0.002726036 0.01317407 0.08720315 0.13633393 0.136831576
## [3,] 0.45186963 0.034523553 0.10040261 0.11293596 0.07033679 0.008836565
## [4,] 0.36772315 0.308790741 0.34994343 0.34715018 0.29573995 0.215320760
##      [,2435]      [,2436]      [,2437]      [,2438]      [,2439]      [,2440]
## [1,] 1.10561942 1.1291995 1.06222329 1.101964437 1.073370654 1.12241781
## [2,] 0.16852867 0.1499034 0.16064311 0.106841768 0.045210954 0.04438253
## [3,] 0.01842005 0.1443275 0.05604326 0.003765617 0.004135392 0.06840091
## [4,] 0.19066189 0.2597453 0.31591844 0.280840382 0.258805564 0.28907460
##      [,2441]      [,2442]      [,2443]      [,2444]      [,2445]      [,2446]
## [1,] 1.14235540 1.13580440 1.12014744 1.1527321 1.16798358 1.11831310
## [2,] 0.02119357 0.02821791 0.04250975 0.0513450 0.06527907 0.05206504
## [3,] 0.09526927 0.11203644 0.05130936 0.1043924 0.12068895 0.03265468
## [4,] 0.29730066 0.30714751 0.31814829 0.2995640 0.40374144 0.48598355
##      [,2447]      [,2448]      [,2449]      [,2450]      [,2451]      [,2452]
## [1,] 1.10505753 1.04799075 1.09387800 1.03797162 0.98862614 0.973063161
## [2,] 0.07834767 0.09565766 0.05648769 0.02515393 0.06880705 0.081685316
## [3,] 0.01035884 0.03282849 0.09651253 0.05193201 0.00221515 0.002265683
## [4,] 0.42739969 0.22315773 0.03938174 0.03438990 0.09569361 0.238839418
##      [,2453]      [,2454]      [,2455]      [,2456]      [,2457]      [,2458]
## [1,] 1.010866967 1.036067582 1.04928928 1.08247342 1.1013088577 1.10192809
## [2,] 0.098785484 0.127304965 0.07870594 0.01474573 0.0004070162 0.01404631
## [3,] 0.005647038 0.006758489 0.02532348 0.01893991 0.0257063161 0.01471011
## [4,] 0.113525678 0.010128954 0.09472137 0.12482244 0.0576493969 0.01299024
##      [,2459]      [,2460]      [,2461]      [,2462]      [,2463]      [,2464]
## [1,] 1.096505598 1.105191739 1.018491072 1.0237858 1.06822564 1.06602821
## [2,] 0.008364215 0.007189923 0.008598302 0.1042025 0.14583216 0.12062935
## [3,] 0.013274804 0.073231066 0.014435365 0.1190037 0.07418116 0.07596946
## [4,] 0.008805860 0.065180778 0.212956103 0.2794861 0.20534541 0.15115823
##      [,2465]      [,2466]      [,2467]      [,2468]      [,2469]      [,2470]
## [1,] 1.09652769 1.07633844 1.11017050 1.07949253 1.053389119 1.010900477
## [2,] 0.12400131 0.03688387 0.03192158 0.01484945 0.007955452 0.008562541
## [3,] 0.08998721 0.07568895 0.23474670 0.30594075 0.280496121 0.262648056
## [4,] 0.15581431 0.09128885 0.05336898 0.03529604 0.162513946 0.311332779
##      [,2471]      [,2472]      [,2473]      [,2474]      [,2475]
##      [,2476]
## [1,] 1.003719922 0.99074803 0.9789307586 1.02290009 1.07317580
1.1116611287
## [2,] 0.002945669 0.00798123 0.0005477342 0.01466765 0.01701147
0.0006305149

```

```

## [3,] 0.277766432 0.36083752 0.4524136081 0.39681022 0.34520069
0.4024928219
## [4,] 0.348343673 0.32857331 0.3152921850 0.27868339 0.32010012
0.3844558557
##      [,2477]      [,2478]      [,2479]      [,2480]      [,2481]      [,2482]
## [1,] 1.139895343 1.1316033976 1.10210019 1.09891634 1.08113066 1.0774638
## [2,] 0.007841964 0.0009781065 0.06018482 0.07462656 0.09215886 0.1055813
## [3,] 0.427014417 0.3844924810 0.32705420 0.20030415 0.25872716 0.1265097
## [4,] 0.362249178 0.3574182250 0.37208615 0.37416011 0.37303658 0.2537597
##      [,2483]      [,2484]      [,2485]      [,2486]      [,2487]      [,2488]
## [1,] 1.09603468 1.10180361 1.09761597 1.07519449 1.02105423 1.023872002
## [2,] 0.09094816 0.04192528 0.09746880 0.09788384 0.02967623 0.007532139
## [3,] 0.09651928 0.08979460 0.09256734 0.14541970 0.10892999 0.072167544
## [4,] 0.23071427 0.25394992 0.20907259 0.23686958 0.34886471 0.374981332
##      [,2489]      [,2490]      [,2491]      [,2492]      [,2493]      [,2494]
## [1,] 0.94855790 1.018631784 1.095910199 1.08047368 1.12364427 1.13410437
## [2,] 0.01154731 0.002160882 0.006693773 0.01212024 0.01905103 0.01857678
## [3,] 0.03403093 0.062706320 0.057038213 0.06907256 0.21360774 0.19829866
## [4,] 0.29586919 0.275690139 0.267019566 0.29357547 0.26650760 0.29141315
##      [,2495]      [,2496]      [,2497]      [,2498]      [,2499]      [,2500]
## [1,] 1.1149993 1.12494285 1.11447759 1.10520997 1.10561910 1.12330882
## [2,] 0.0461997 0.03535055 0.06936486 0.06633227 0.08082475 0.07662228
## [3,] 0.0982458 0.11769407 0.14404042 0.09472930 0.07844053 0.02669578
## [4,] 0.3567415 0.41630500 0.53393693 0.55581319 0.24848910 0.07374425
##
## $A
##      [,1]      [,2]      [,3]      [,4]
## [1,] 2.739165e-01 2.857183e-01 1.536277e-01 2.021473e-01
## [2,] 4.259955e-04 6.581570e-01 3.099986e-01 3.780251e-02
## [3,] 5.247390e-03 4.785164e-01 2.194466e-01 2.321690e-01
## [4,] 2.939686e-01 1.254847e-01 6.760830e-02 4.083363e-01
## [5,] 1.240616e-01 5.539448e-01 1.505231e-01 1.168797e-01
## [6,] 2.437853e-03 3.932496e-01 3.623703e-01 2.160514e-01
## [7,] 2.395848e-01 3.483679e-01 1.591691e-01 1.676952e-01
## [8,] 1.872780e-01 3.085380e-01 2.433438e-02 3.793867e-01
## [9,] 5.601458e-01 1.361620e-01 1.340151e-01 3.203645e-02
## [10,] 2.382841e-01 3.044070e-01 2.369556e-01 1.683943e-01
## [11,] 3.792346e-01 2.261656e-01 3.223589e-01 5.860015e-02
## [12,] 2.997195e-01 3.394388e-01 3.187382e-01 1.320929e-02
## [13,] 2.715061e-01 2.574115e-01 6.975680e-02 3.047025e-01
## [14,] 1.592973e-02 3.626890e-01 3.433307e-01 2.316655e-01
## [15,] 3.430042e-01 1.731632e-01 1.582901e-01 2.274032e-01
## [16,] 4.405842e-02 3.818359e-01 3.344539e-01 2.088155e-01
## [17,] 4.822208e-02 6.544814e-01 1.725022e-01 8.597153e-02
## [18,] 2.824727e-01 2.929495e-01 1.600827e-02 3.045008e-01
## [19,] 4.398045e-01 1.106251e-01 6.461645e-02 2.586589e-01
## [20,] 1.067221e-02 1.243894e-01 6.169550e-01 2.560130e-01
## [21,] 2.561064e-01 3.038450e-01 4.973395e-01 1.232994e-04
## [22,] 3.592660e-01 1.317032e-01 5.128121e-01 2.624798e-04
## [23,] 2.897351e-01 1.867423e-01 2.568460e-01 2.104561e-01

```

```
## [24,] 1.540110e-01 3.350426e-01 1.448633e-01 2.914474e-01
## [25,] 2.737436e-03 3.193734e-01 3.155022e-01 2.982024e-01
## [26,] 3.031964e-03 1.588629e-01 8.368986e-02 5.389665e-01
## [27,] 3.999200e-01 1.017697e-01 1.254828e-01 2.674532e-01
## [28,] 2.834731e-01 3.756391e-01 1.277395e-01 1.288939e-01
## [29,] 2.512587e-01 6.434256e-02 2.885966e-01 3.464918e-01
## [30,] 2.644637e-01 4.149839e-01 2.601032e-01 1.432338e-02
## [31,] 2.137647e-01 3.000199e-01 7.772239e-02 3.225820e-01
## [32,] 1.897065e-03 4.176806e-01 4.243760e-01 1.572179e-01
## [33,] 2.106738e-03 4.960072e-01 1.299480e-01 2.855970e-01
## [34,] 1.383950e-01 3.508683e-01 4.292205e-03 4.019702e-01
## [35,] 1.269241e-01 3.581301e-03 1.349064e-01 5.413293e-01
## [36,] 7.969588e-02 6.612835e-01 2.100309e-01 7.179961e-03
## [37,] 2.072747e-01 1.943965e-01 1.313822e-01 3.853901e-01
## [38,] 3.107841e-01 2.423704e-01 5.735625e-02 2.802571e-01
## [39,] 2.019220e-01 5.714593e-02 1.118974e-01 4.840731e-01
## [40,] 3.517991e-01 1.101172e-01 2.445993e-01 2.232912e-01
## [41,] 3.130445e-01 2.133352e-01 8.333149e-02 2.850922e-01
## [42,] 3.158749e-01 2.917985e-01 1.323328e-01 1.626427e-01
## [43,] 2.992883e-01 3.095810e-01 1.226822e-01 1.707157e-01
## [44,] 4.018905e-01 1.824714e-01 2.974932e-01 8.806001e-02
## [45,] 3.873674e-01 5.572297e-02 6.755496e-03 4.248913e-01
## [46,] 2.585848e-02 2.570878e-01 1.188641e-01 4.335683e-01
## [47,] 3.407844e-01 3.830542e-01 1.429495e-01 2.212797e-02
## [48,] 1.698953e-02 5.821887e-01 2.965692e-01 9.403634e-02
## [49,] 4.316525e-01 4.058422e-02 3.241690e-01 1.579531e-01
## [50,] 3.955038e-01 3.304466e-01 7.145089e-02 8.942178e-02
## [51,] 3.236627e-01 1.916376e-01 1.295972e-01 2.566136e-01
## [52,] 4.056455e-01 2.894899e-01 5.994617e-02 1.375283e-01
## [53,] 2.819260e-01 2.045301e-01 1.891452e-01 2.451539e-01
## [54,] 2.770229e-01 1.788553e-01 3.570098e-01 1.738123e-01
## [55,] 6.844299e-02 2.438517e-01 3.566223e-01 2.874229e-01
## [56,] 3.508883e-02 3.474246e-01 3.124581e-01 2.497180e-01
## [57,] 1.878715e-01 3.916210e-01 4.520107e-01 1.101949e-02
## [58,] 2.091369e-03 1.497378e-01 5.815322e-02 5.628343e-01
## [59,] 3.192294e-03 3.339231e-01 5.314381e-01 1.721269e-01
## [60,] 2.513695e-01 4.956363e-01 2.041392e-02 1.264818e-01
## [61,] 3.184252e-01 4.080962e-01 9.451522e-02 6.916414e-02
## [62,] 2.351558e-01 2.754249e-01 2.468118e-02 3.593495e-01
## [63,] 3.266263e-01 2.127108e-01 3.901238e-01 7.663533e-02
## [64,] 2.369301e-01 1.501254e-01 1.402444e-01 3.856679e-01
## [65,] 5.543733e-01 1.344002e-01 1.419832e-01 4.890197e-02
## [66,] 1.626010e-01 2.434492e-01 6.852126e-01 4.735510e-02
## [67,] 1.497686e-03 2.029639e-01 8.476601e-02 5.220117e-01
## [68,] 3.566598e-01 1.001957e-01 2.052887e-02 4.031003e-01
## [69,] 5.129670e-01 2.113796e-03 2.686233e-01 1.282269e-01
## [70,] 3.440745e-01 3.698353e-01 6.733704e-02 1.151140e-01
## [71,] 1.185496e-01 2.828538e-01 3.775348e-01 2.189640e-01
## [72,] 2.205213e-02 3.935432e-01 2.033363e-01 2.879041e-01
## [73,] 1.543457e-01 2.295369e-01 4.042374e-01 2.254934e-01
```



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## [74,] 1.616337e-02 2.102263e-01 2.202994e-01 4.179847e-01
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## [1952,] 1.999418e-01 5.385239e-01 4.354307e-02 1.288167e-01  
## [1953,] 3.591018e-01 2.305105e-01 3.004126e-01 7.725249e-02  
## [1954,] 3.597261e-01 3.182291e-01 6.773926e-04 2.055547e-01  
## [1955,] 1.741799e-01 3.737571e-01 3.751403e-01 8.315838e-02  
## [1956,] 3.227456e-01 3.644486e-01 1.270722e-01 9.289960e-02  
## [1957,] 3.192071e-01 1.338442e-01 2.218254e-01 2.459410e-01  
## [1958,] 6.601910e-02 3.275041e-01 3.778047e-01 2.123149e-01  
## [1959,] 1.936021e-01 3.058288e-01 6.091000e-01 1.687016e-04  
## [1960,] 3.178020e-01 2.163810e-01 6.087604e-03 3.414022e-01  
## [1961,] 2.383482e-03 3.406859e-01 2.303905e-01 3.261953e-01  
## [1962,] 6.110534e-02 1.450829e-01 6.237540e-01 2.080661e-01  
## [1963,] 1.700126e-01 3.195980e-01 2.844579e-01 1.952744e-01  
## [1964,] 1.846500e-01 4.619673e-01 1.869054e-02 2.407021e-01  
## [1965,] 2.155376e-01 1.489646e-01 2.688520e-01 3.139220e-01  
## [1966,] 3.167664e-01 1.489376e-01 1.706760e-03 4.203562e-01  
## [1967,] 2.587835e-01 3.656490e-01 3.374033e-01 2.798930e-02  
## [1968,] 7.310521e-02 3.372193e-01 5.523458e-01 1.064563e-01  
## [1969,] 2.829621e-03 2.544182e-01 7.579754e-01 1.005732e-01  
## [1970,] 3.088424e-01 3.407427e-01 2.364724e-01 5.595446e-02  
## [1971,] 1.487033e-01 4.591348e-01 5.955551e-02 2.520826e-01  
## [1972,] 3.029529e-01 2.352783e-01 2.608440e-01 1.467605e-01  
## [1973,] 3.640467e-03 2.147622e-01 5.657394e-01 2.362173e-01

```
## [1974,] 5.858234e-01 6.198098e-02 9.435252e-02 1.220283e-01
## [1975,] 3.909461e-01 3.145786e-02 4.264899e-03 4.335658e-01
## [1976,] 6.402403e-02 5.331922e-01 2.651791e-02 2.896712e-01
## [1977,] 3.145818e-01 1.305092e-01 1.909313e-01 2.798097e-01
## [1978,] 4.364557e-01 1.664057e-01 8.482877e-03 2.652966e-01
## [1979,] 1.515738e-03 1.397097e-01 5.640447e-01 2.885179e-01
## [1980,] 3.147448e-03 2.355172e-01 4.431556e-01 2.917456e-01
## [1981,] 2.579791e-01 3.707449e-01 1.838490e-01 1.107425e-01
## [1982,] 3.691612e-01 3.395440e-01 2.098468e-02 1.519094e-01
## [1983,] 1.354234e-01 2.378061e-01 7.643514e-01 9.198505e-03
## [1984,] 1.519892e-01 2.143893e-02 1.741793e-01 4.947690e-01
## [1985,] 2.958915e-01 6.847970e-02 1.886883e-01 3.707425e-01
## [1986,] 1.196296e-01 3.590838e-02 3.575808e-01 3.878291e-01
## [1987,] 4.557720e-03 1.726125e-01 6.493216e-01 2.158711e-01
## [1988,] 3.889731e-01 1.259300e-01 3.855002e-01 9.866430e-02
## [1989,] 3.837018e-01 1.275454e-01 3.055250e-01 1.500777e-01
## [1990,] 4.897867e-01 1.688431e-01 1.782863e-01 6.629945e-02
## [1991,] 9.176642e-02 2.530568e-01 3.689244e-01 2.634851e-01
## [1992,] 1.927750e-02 3.006359e-01 2.785249e-01 3.144151e-01
## [1993,] 2.775663e-01 1.725739e-01 1.288953e-01 3.261088e-01
## [1994,] 2.251364e-01 2.022415e-01 2.046806e-01 2.908943e-01
## [1995,] 3.458067e-01 2.731930e-01 1.293236e-01 1.593917e-01
## [1996,] 5.058793e-01 1.784104e-01 6.698690e-02 1.179322e-01
## [1997,] 1.185879e-02 3.471412e-01 7.647153e-01 1.775923e-03
## [1998,] 1.227908e-01 2.996322e-01 4.405525e-01 1.752425e-01
## [1999,] 2.264512e-04 2.443976e-01 1.621426e-01 4.338270e-01
## [2000,] 2.764265e-03 4.480261e-01 3.901724e-01 1.647455e-01
```

```
map_il(1:4, ~ {
  t(AS$S)[,x] %>% as.vector %>% as.cimg(x=50,y=50)
}) %>%
  imappend(axis = "x") %>%
  plot(axes = F)
```



```
# 10 iterations on Image Dataset
#testASsigma_img <- nmfGibbsASsigma(img_mat, t(A), t(S), sigma =
rep(0.1,nrow(img_mat)), sigBeta=1e-3, N=10)

#save(testASsigma_img, file = "testASsigma_ten")

# Loading the results of 10 iterations on Image Dataset
testteniterations_img <- load("testASsigma_ten")

firsttestASsigma_img <- testASsigma_img[1][[1]]
thirdtestASsigma_img <- testASsigma_img[3][[1]]
fifthtestASsigma_img <- testASsigma_img[5][[1]]
seventestASsigma_img <- testASsigma_img[7][[1]]
ninetestASsigma_img <- testASsigma_img[9][[1]]
tenthtestASsigma_img <- testASsigma_img[10][[1]]

firsttestASsigma_imgresult <- map_il(1:4, ~ {
  t(firsttestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)
}) %>%
  imappend(axis = "x") %>%
  plot(axes = F)
```





```
thirdtestASsigma_imgresult <- map_il(1:4, ~ {  
  t(thirdtestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)  
}) %>%  
  imappend(axis = "x") %>%  
  plot(axes = F)
```



```
fifthtestASsigma_imgresult <- map_il(1:4, ~ {  
  t(fifthtestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)  
}) %>%  
  imappend(axis = "x") %>%  
  plot(axes = F)
```



```
seventestASsigma_imgresult <- map_il(1:4, ~ {  
  t(seventestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)  
}) %>%  
  imappend(axis = "x") %>%  
  plot(axes = F)
```



```
ninetestASsigma_imgresult <- map_il(1:4, ~ {  
  t(ninetestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)  
}) %>%  
  imappend(axis = "x") %>%  
  plot(axes = F)
```



```
tenthtestASsigma_imgresult <- map_il(1:4, ~ {  
  t(tenthtestASsigma_img$S)[,.x] %>% as.vector %>% as.cimg(x=50,y=50)  
}) %>%  
  imappend(axis = "x") %>%  
  plot(axes = F)
```



#### *#Source 1*

```
for (i in 1:11) {  
  print(testASsigma_img[[i]]$S[1,1000])  
}
```

```
## [1] 1.311085  
## [1] 1.293191  
## [1] 1.300058  
## [1] 1.298632  
## [1] 1.298757  
## [1] 1.297474  
## [1] 1.297103  
## [1] 1.297048  
## [1] 1.296701  
## [1] 1.296408  
## [1] 1.295162
```

#### *#Source 2*

```
for (i in 1:11) {  
  print(testASsigma_img[[i]]$S[2,1000])  
}
```

```
## [1] 0.6120096  
## [1] 0.6159679  
## [1] 0.6193633  
## [1] 0.6216383  
## [1] 0.6221935
```

```
## [1] 0.6229845
## [1] 0.6243982
## [1] 0.6261331
## [1] 0.6273448
## [1] 0.628812
## [1] 0.6307369
```

#### *#Source 3*

```
for (i in 1:11) {
  print(testASsigma_img[[i]]$S[3,1000])
}
```

```
## [1] 0.5150149
## [1] 0.5262473
## [1] 0.5276728
## [1] 0.5266527
## [1] 0.5278104
## [1] 0.5288508
## [1] 0.5288869
## [1] 0.5286349
## [1] 0.5295101
## [1] 0.5314617
## [1] 0.5316149
```

#### *#Source 4*

```
for (i in 1:11) {
  print(testASsigma_img[[i]]$S[4,1000])
}
```

```
## [1] 0.7503936
## [1] 0.7457987
## [1] 0.7469188
## [1] 0.7472474
## [1] 0.7475345
## [1] 0.7476396
## [1] 0.7474395
## [1] 0.7475079
## [1] 0.7461703
## [1] 0.7451729
## [1] 0.7456791
```

#### *#Source 1*

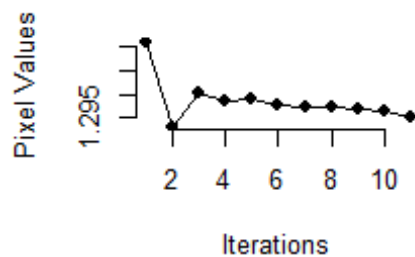
```
y1 = list()
x1 = list()
y2 = list()
x2 = list()
y3 = list()
x3 = list()
y4 = list()
x4 = list()
for (i in 1:11) {
```

```

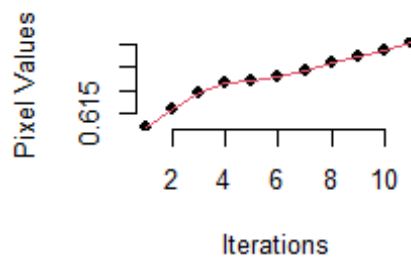
x1 = append(x1,i)
y1 = append(y1,testASsigma_img[[i]]$S[1,1000])
x2 = append(x2,i)
y2 = append(y2,testASsigma_img[[i]]$S[2,1000])
x3 = append(x3,i)
y3 = append(y3,testASsigma_img[[i]]$S[3,1000])
x4 = append(x4,i)
y4 = append(y4,testASsigma_img[[i]]$S[4,1000])
}
par(mfrow=c(2,2))
plot(x1, y1, main = "Plot for 10 Iterations - Source 1",
     xlab = "Iterations", ylab = "Pixel Values",
     pch = 19, frame = FALSE)
lines(x1, y1, type = "l", lty = 1, col = "1")
plot(x2, y2, main = "Plot for 10 Iterations - Source 2",
     xlab = "Iterations", ylab = "Pixel Values",
     pch = 19, frame = FALSE)
lines(x2, y2, type = "l", lty = 1, col = "2")
plot(x3, y3, main = "Plot for 10 Iterations - Source 3",
     xlab = "Iterations", ylab = "Pixel Values",
     pch = 19, frame = FALSE)
lines(x3, y3, type = "l", lty = 1, col = "3")
plot(x4, y4, main = "Plot for 10 Iterations - Source 4",
     xlab = "Iterations", ylab = "Pixel Values",
     pch = 19, frame = FALSE)
lines(x4, y4, type = "l", lty = 1, col = "4")

```

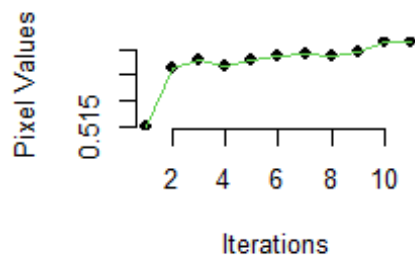
**Plot for 10 Iterations - Source**



**Plot for 10 Iterations - Source**



**Plot for 10 Iterations - Source**



**Plot for 10 Iterations - Source**

