

Eigenvectors of Symmetric Matrices

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```
S <- RM_symm(8,0.5,10)
prop <- prop_real_rows(eigen_frame = evec_frame(S))
prop
```

```
## # A tibble: 8 x 3
##   row_i prop_reals is_real
##   <dbl>      <dbl> <lgl>
## 1     1         1     TRUE
## 2     2         1     TRUE
## 3     3         1     TRUE
## 4     4         1     TRUE
## 5     5         1     TRUE
## 6     6         1     TRUE
## 7     7         1     TRUE
## 8     8         1     TRUE
```

```
avgprop_real_components(evec_frame(S))
```

```
## [1] 1
```

Simulation

```
simulate_by_f <- function(f,M_max,ep_max,draws){
  M_vec <- sample(1:M_max, draws, replace = T)
  ep_vec <- sample(1:ep_max, draws, replace = F)
  table <- data.frame(M = M_vec, ep = rep(ep_vec,length(M_vec)))

  prop_vec <- rep(NA, length(table$M))

  for(i in 1:length(table$M)){
    S_curr <- RM_symm(table$M[i],f,table$ep[i])
    prop <- avgprop_real_components(evec_frame(S_curr))
    #print(prop)
    prop_vec[i] <- prop
  }
  cbind(table,prop_vec)
}

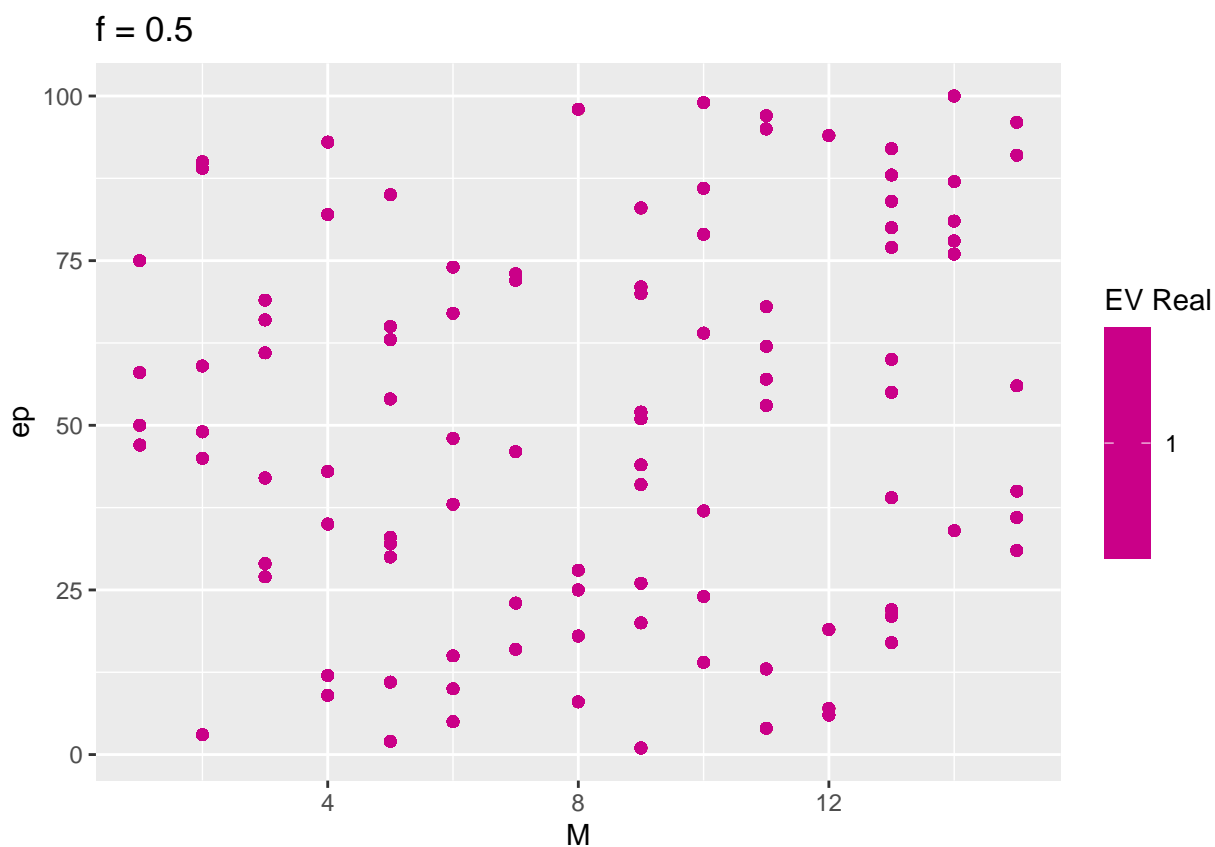
plot_f_table <- function(table, f){
  ggplot() +
    geom_point(data = table, aes(x=M, y=ep, color = prop_vec)) +
    labs(color = "EV Real", title = paste("f = ",f,sep="")) +
    scale_color_gradient(high="blue", low="red")
}
```

```
M <- 15
ep <- 100
d <- ep
```

```
f <- 0.5
table <- simulate_by_f(f = f, M_max = M, ep_max = ep, draws = d)
head(table)
```

```
##      M ep prop_vec
## 1 15 56         1
## 2  7 73         1
## 3  5 30         1
## 4  9 70         1
## 5 13 88         1
## 6 14 81         1
```

```
plot_f_table(table, f = f)
```



```
f <- 0.1
#table <- simulate_by_f(f = f, M_max = M, ep_max = ep, draws = d)
#head(table)
#plot_f_table(table, f = f)
```

```
f <- 0.9
#table <- simulate_by_f(f = f, M_max = M, ep_max = ep, draws = d)
#head(table)
#plot_f_table(table, f = f)
```