

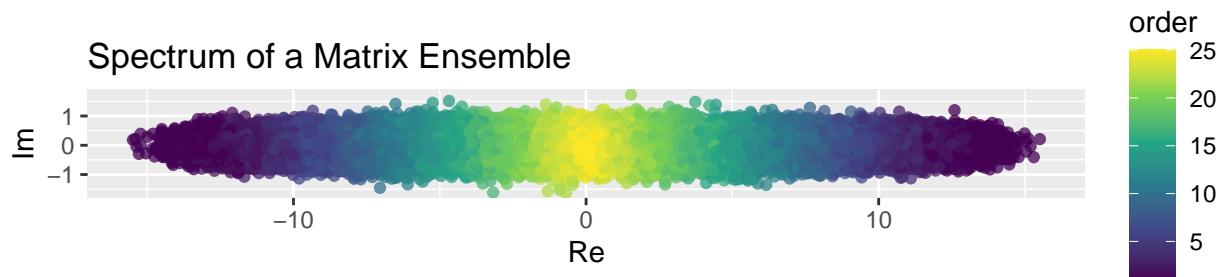
Dispersion of Eigenvalues & Order Statistics

Taqi

Ensemble of 25x25 Complex Hermitian Matrices

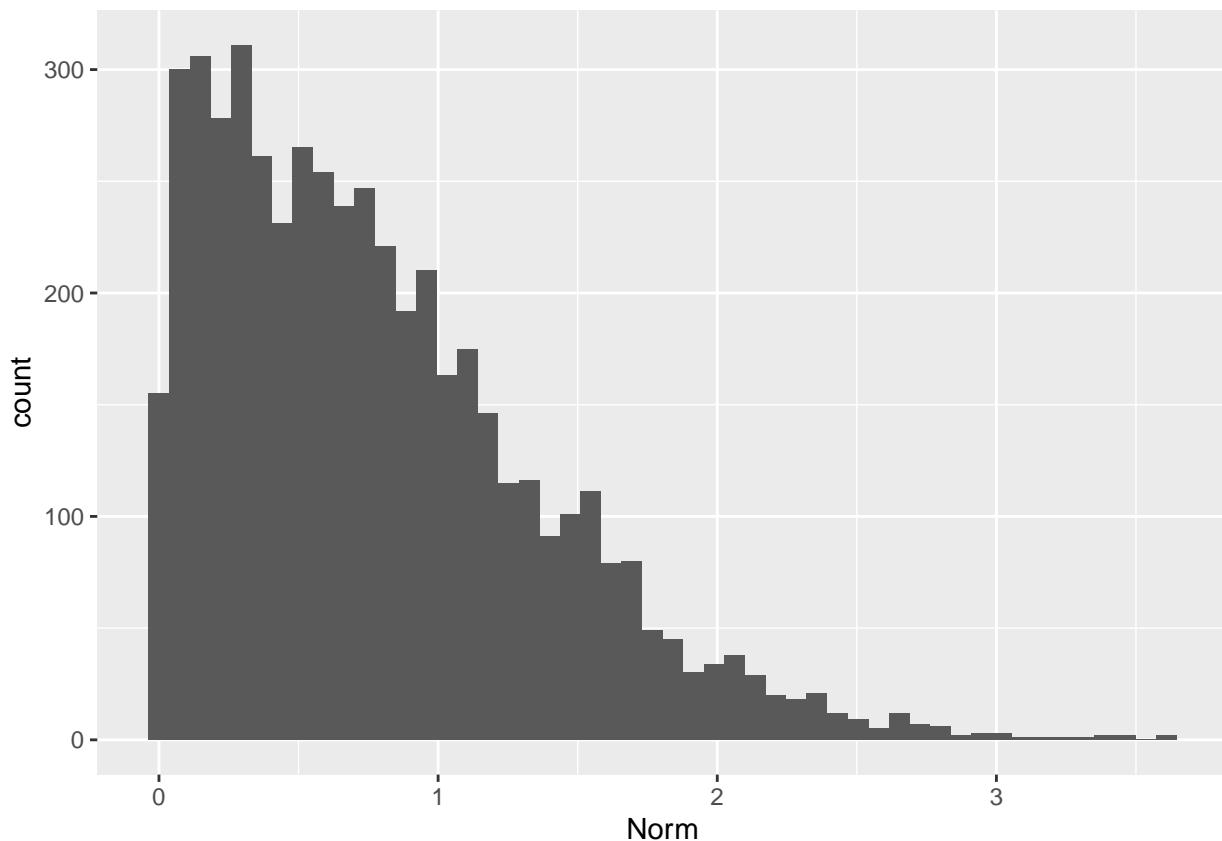
```
P <- RME_norm(N = 25, cplx = T, herm = T, size = 5000)
#P %>% dispersion(components = T)
spec_P <- P %>% spectrum
order_1 <- spec_P %>% filter(Order == 1)
order_2 <- spec_P %>% filter(Order == 2)
diff_12 <- order_1 - order_2

spec_P %>% spectrum.scatterplot()
```



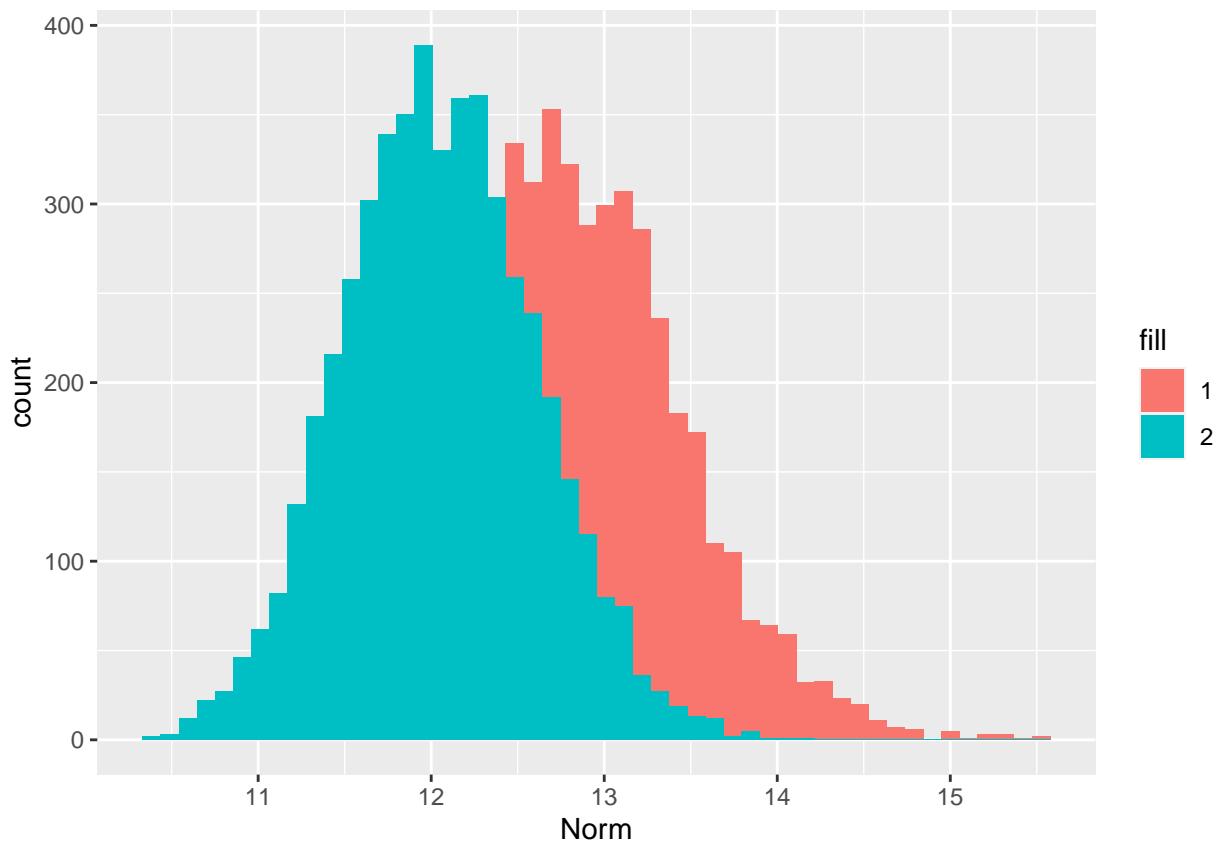
Distribution of Eigenvalue Norms

```
diff_12 %>%
  ggplot(mapping = aes(x = Norm)) +
  geom_histogram(bins = 50)
```



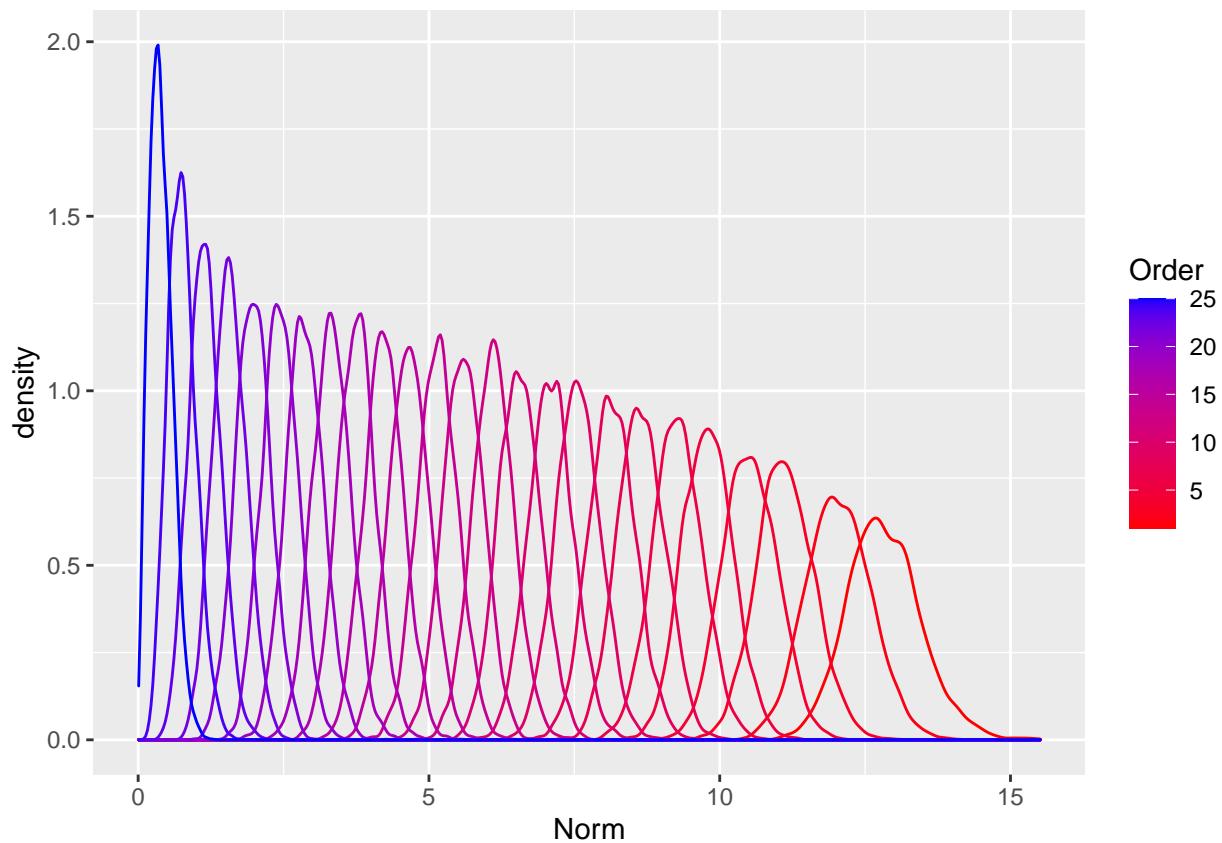
Distribution of the Eigenvalue Norm by Ranking

```
ggplot() +  
  geom_histogram(data = order_1, mapping = aes(x = Norm, fill = "1"), bins = 50) +  
  geom_histogram(data = order_2, mapping = aes(x = Norm, fill = "2"), bins = 50)
```



Eigenvalue Norm Distribution by Ranking

```
spec_P %>%
  ggplot(mapping = aes(x = Norm, group = Order, color = Order)) +
  geom_density(kernel = "gaussian") +
  scale_color_gradient(low = "red", high = "blue")
```



Variance of Eigenvalue Norms by Rank

```

vec_order <- 1:nrow(P[[1]])
vec_var <- purrr::map_dbl(vec_order, order_kurtosis, spec_P, var)
df_var <- data.frame(Order = vec_order, Variance = vec_var)

# Plot
df_var %>%
  ggplot(mapping = aes(Order, Variance)) +
  geom_point() +
  geom_line()

```

