Computational Simulation of the Eigenvalues of a Stochastic Matrix

Ali Taqi

Eigenvalues of a Symmetric Stochastic Matrix

```
################################
### Step 0: Setup the matrix ###
################################

# Set seed
set.seed(25)
# Set parameters
M <- 2
# Generate matrix
P <- RM_stoch(M, symm = T, sparsity = F)
if(bool_loud){P}

################################
#### Step 1: Get the batch ####
################################

# Set batch parameters
B <- 100
# Create batch
batch <- make_batch(M = M, B = B)
if(bool_loud){head(batch)}

#################################
#### Step 2: Evolve the batch ####
#################################

# Set evolution parameters
steps <- 50
# Evolve and index batch
evolved_batch <- evolve_batch(batch, steps, with_steps = T)
if(bool_loud){head(evolved_batch)}

#evolve batch ratios
evolved_batch <- append_ratios_2d(evolved_batch)
# Remove first row (degenerate values)
curr_array <- evolved_batch[2:nrow(evolved_batch),]
curr_array <- time_array(curr_array, at_time = steps)
```

```r
###################################
#### Step 3: Analyze the batch ####
###################################

# Analyze batch elements at the last step (full evolution)
fully_evolved <- time_array(curr_array, at_time = steps)
head(fully_evolved)
```

```
##            x1          x2 time element_index r_x1 r_x2
## 1  0.10950781  0.10950781   50             1    1    1
## 2 -0.03636546 -0.03636546   50             2    1    1
## 3 -0.65106801 -0.65106801   50             3    1    1
## 4 -0.30852030 -0.30852030   50             4    1    1
## 5  0.54741916  0.54741916   50             5    1    1
## 6 -0.15706665 -0.15706665   50             6    1    1
```