Demonstrating γ decreases with increasing β

Cape vs SWA publication

Ruan van Mazijk

2018-11-04

Define a simple Jaccard distance function

```r
jacc_dist <- function(a, b) {
  1 - (length(intersect(a, b)) / length(union(a, b)))
}
```

Create a species pool of richness n (analogous to the Cape or SWA)

```r
n <- 1000
region <- 1:n
```

Define the range of richnesses m of the communities to draw from the pool (starting from stupidly a small 1 and ending at $\frac{1}{2}$ of regional richnes)

```r
data <- data.frame(m = 1:(0.5 * n))
```

Draw communites a and b (a and b are analogous to smaller pixels, e.g. QDS), each of richness m, and calculate the richness γ of the larger scale community $a + b$ (analogous to the larger scale pixel, e.g. HDS), and the turnover between a and b (i.e. the turnover "within" the larger scale community)

```r
# Create empty columns to store results
data$richness_ab <- NA
data$jacc_dist_ab <- NA
for (m in data$m) {
  a <- sample(region, m)
  b <- sample(region, m)
  ab <- c(a, b)
  richness_ab <- length(unique(ab))
  jacc_dist_ab <- jacc_dist(a, b)
  # Store results in dataframe
  data$richness_ab[[m]] <- richness_ab
  data$jacc_dist_ab[[m]] <- jacc_dist_ab
  # Store adjusted results in dataframe too
  data$richness_ab_m_adjusted[[m]] <- richness_ab / m
  data$richness_ab_jacc_adjusted[[m]] <- richness_ab / jacc_dist_ab
}
```
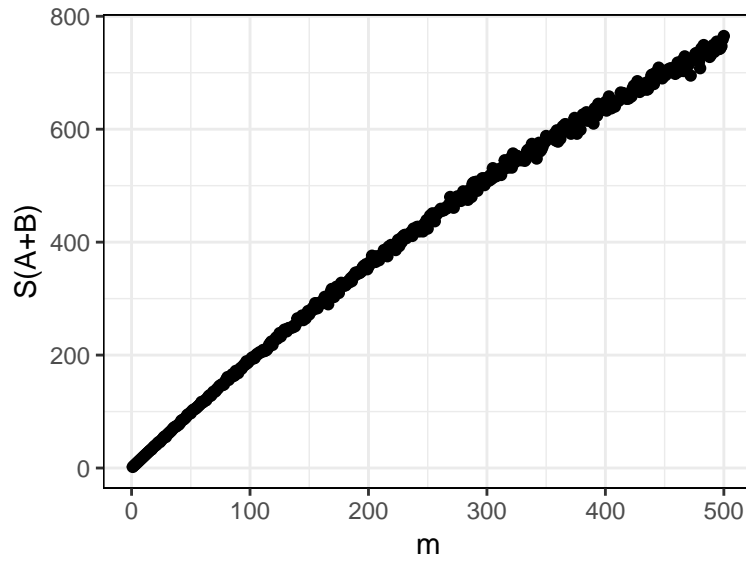
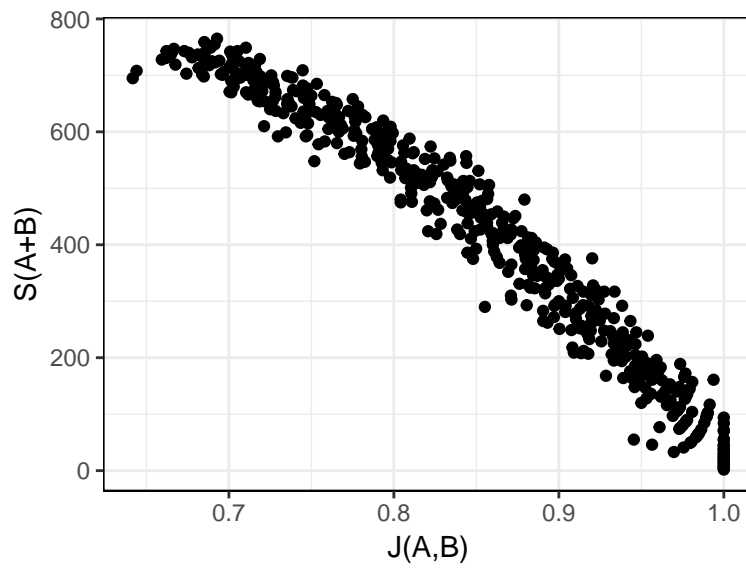Figure 1: Plot of γ as a function of α

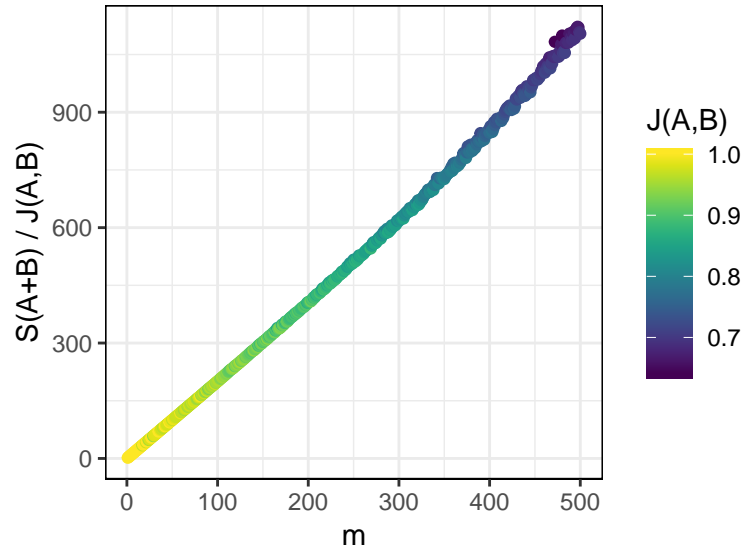Figure 2: Plot of γ as a function of β

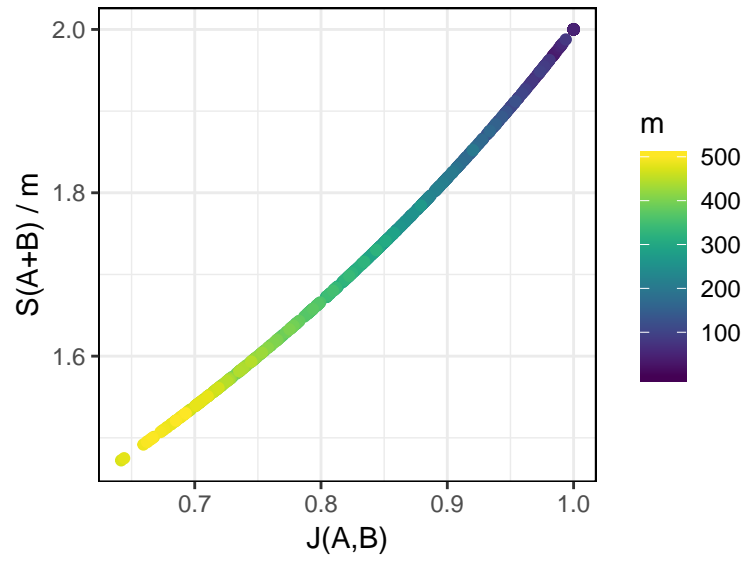Figure 3: Plot of $\gamma_{adjby\beta}$ as a function of α

Figure 4: Plot of $\gamma_{adjby\alpha}$ as a function of β