

Masting time series

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5/7/2018

```
setwd("~/Documents/ShortInvasions/model/mastingTmp/code")

require(tidyverse, quietly = TRUE, warn.conflicts = FALSE)

## -- Attaching packages ----- tidyverse 1.2.1 --
## √ ggplot2 2.2.1      √ purrr  0.2.4
## √ tibble  1.4.2      √ dplyr  0.7.4
## √ tidyr   0.8.0      √ stringr 1.3.0
## √ readr   1.1.1      √ forcats 0.3.0

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
require(readxl, quietly = TRUE)

generateMastTimeSeries <- function(howManyYears = 200,
                                   probs = c(0.005, 0.05, 0.746)){

  # Param notes:
  # howManyYears is the duration of the time series
  # probs are the unique probabilities for masting
  # given 1, 2, 3 years since last mast
  # the last value is taken to be the same as
  # all those subsequent (see below)

  allYears <- 1:howManyYears

  # the masting likelihood for the length of the time series
  # even though it's almost impossible for it to last that long
  # is the first two probabilities and then the last probability
  # repeated for the length of it
  mastLikelihood <- c(probs, rep(probs[length(probs)],
                                length.out = howManyYears - length(probs)))

  binaryMast <- vector(length = length(howManyYears))
  mastTimeLag <- vector(length = length(howManyYears))

  for(i in seq_along(allYears)){

    if(i < 2){
      # if we are in the first year, do a random draw from 1 to 3
      timeSinceMast <- sample(1:3, size = 1)
    }

    # how many years since the last mast
    # if it was last year, then it will be 1
  }
```

```

mastTimeLag[i] <- timeSinceMast

# the likelihood for this time since mast
thisLikelihood <- mastLikelihood[timeSinceMast]

# draw from a binomial distribution with a probability
# of the above
# 1 = mast, 0 = no mast
isMast <- rbinom(n = 1, size = 1, prob = thisLikelihood)

# assign the result to the vector
binaryMast[i] <- isMast

# if we had a mast, reset the counter
if(isMast > 0){
  timeSinceMast <- 1
} else {
  # otherwise increment the counter
  timeSinceMast <- timeSinceMast + 1
}
}

# combine the year counter, the isMast counter and the time since
# mast counter into the output
mastingLoopOut <- data.frame(allYears, binaryMast, mastTimeLag)

return(mastingLoopOut)
}

mastOut <- generateMastTimeSeries(howManyYears = 500)

knitr::kable(mastOut %>% filter(binaryMast == 1) %>%
  group_by(mastTimeLag) %>%
  summarise(nobs = n()) %>%
  data.frame())

```

mastTimeLag	nobs
2	10
3	108
4	26
5	3
6	5
7	1

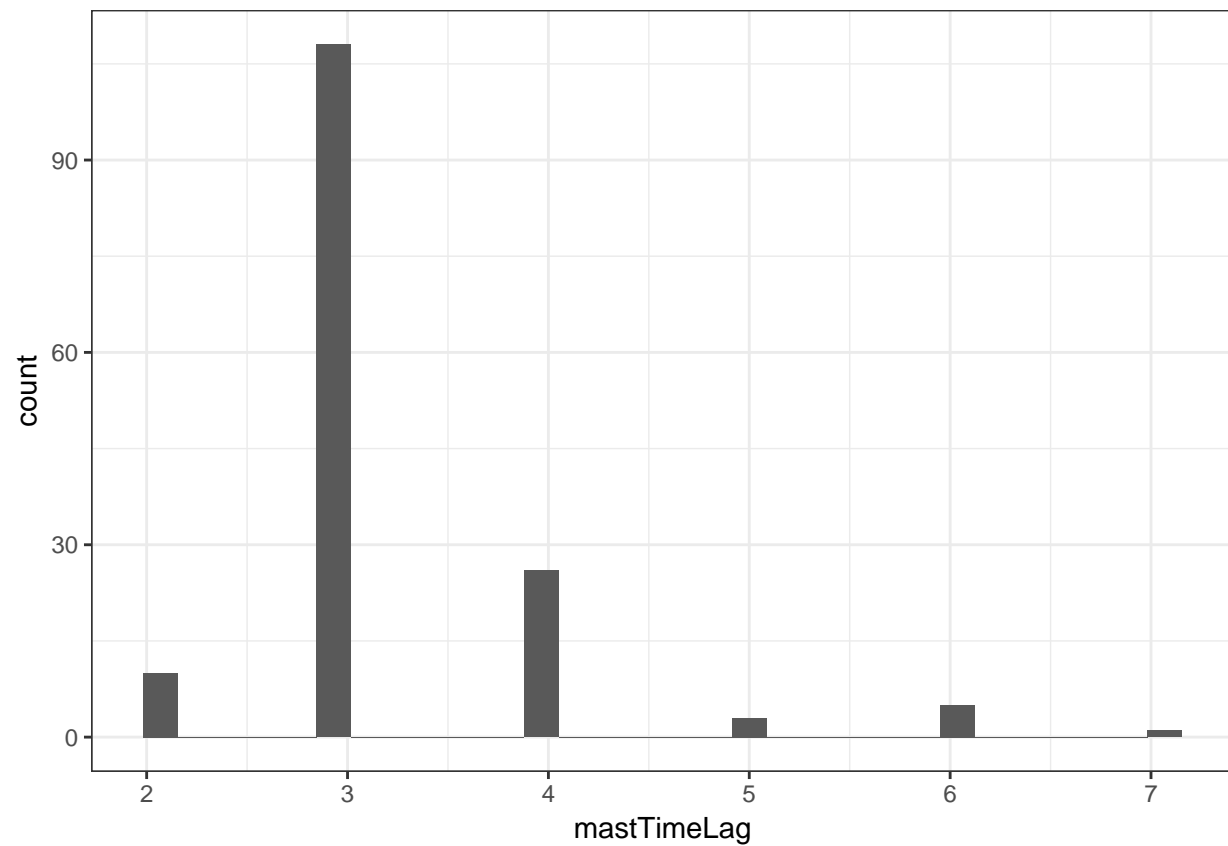
```

mastOut %>% filter(binaryMast == 1) %>%
  ggplot(., aes(x = mastTimeLag)) +
  geom_histogram() +

```

```
theme_bw()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



```
ggplot(mastOut, aes(x = allYears, y = binaryMast)) +  
  geom_line() +  
  theme_bw() +  
  ggtitle("Masting time series (500 yr duration)")
```

