GamifyingEvolution

Abstract

Introduction

Basic Evolutionary Model

Variation Inheritance Selection Time

Evolution as a Game Mechanic

Variation Inheritance Selection Time

Tradeoffs and Design Decisions

Variation

Standing Genetic Variation

Mutational Processes

Frequency and Effect Size: Example 1: Low frequency of mutation = "realistic", High frequency = enough variation for evolution to use.

Example 2: Using mutational processes to scale difficulty (Darwin's Demons)

Inheritance

Sexual vs asexual. Hermaphrodites? Encoding the digital genome (quantitative trait model vs discrete alleles)

Selection

Fitness functions Mechanisms of selection

Example: On vs off (adaptation vs drift)

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.2     v readr     2.1.4
v forcats   1.0.0     v stringr   1.5.0
v ggplot2   3.4.2     v tibble    3.2.1
v lubridate 1.9.2     v tidyr     1.3.0
v purrr     1.0.1
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to beco
```

```
library(purrr)


path <- "Hastur"

# Get a list of all .csv files in the directory that contain "Run3" in their name
files <- list.files(path, pattern = "*.csv", full.names = TRUE)

# Use purrr's map_df function to read each .csv file into a data frame
# and bind them together into a single data frame
df <- files %>%
  purrr::map_df(~read_csv(.), show_col_types = FALSE)
```

```
Rows: 13082 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13539 Columns: 84
-- Column specification --------------------------------------------------------
```

```
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13029 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13023 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12979 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12851 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12748 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12249 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
```

```
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13446 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13536 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 11472 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12696 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13459 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12920 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...
```

```
i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12419 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 12768 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.


Warning: One or more parsing issues, call `problems()` on your data frame for details,
e.g.:
  dat <- vroom(...)
  problems(dat)


Rows: 12568 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
Rows: 13462 Columns: 84
-- Column specification --------------------------------------------------------
Delimiter: ","
dbl (84): Generation, ID, P1ID, P2ID, Origin, AsexualReproduction, FitnessTo...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Hidden fitness functions

Example: Civilians and clonal reproduction.

Population Size: Performance Vs. Drift

Example: Genetic Drift and Effective Population Size

Time

Generational model = waves

Continuous model