EDS Assignment 7

Review of SS3sim

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Package title

{SS3sim}

Location

The package can be downloaded from Cran or from Github. 1) Cran

```
install.packages('ss3sim',
                 repos='https://cran.r-project.org/web/packages/ss3sim/index.html'
                 , dependencies=TRUE)
```

2) Github

```
remotes::install_github(
  "ss3sim/ss3sim",
  ref = "main",
  build_vignettes = TRUE, dependencies = TRUE
)
```

Vignette(s)

{ss3sim} has a number of useful help files.

There are three documents which are useful when working with {ss3sim}. The first is the .README, which is comprehensive and offers notes on the installation, file structure and an example simulation of the package. The README.md can be found here

There are three vignettes available on the github which cover
1) Introduction
2) Making models
3) Modifying models.

The package is actively under development by NOAA, and as such the discussion board,on github is particularly useful for resolving queries.

There is also an introduction avilable on CRAN however it is deprecated and following the instructions will not allow the user to create simulations. This is particularly problematic as when Google is used to search for introductory material, the CRAN intro is the first result.

Application(s)

The primary application of the package is that it allows users to crate simulated fish populations and estimate them using the Stock Synthesis 3 modelling framework.The package has been employed for simulation testing documented in peer-review literature. Notable publications include:

Monnahan et al. (2016)
Ono et al. (2015)
Rudd et al. (2021)

Review

`{ss3sim}` is an r package which allows users to simulate fish stock populations and asses them using Stock Synthesis 3 modelling framework. The package was initially developed as part of a graduate class project in the school of Aquatic and fisheries Science , University of Washington, with the project being led by Sean Anderson (Anderson et al. (2014)). Each simulation has three components an Operating model (OM) which represent the true population such as natural mortality M, recruitment R and fishing mortality F,the Estimation method (EM) (Stock assessments, survey data etc) which denotes how the population is to be assessed and the control file, which allows the users how and when they would like to alter the EM and OM.

While the file structure of the does appear cumbersome at first, running a pre-specification (or boiler plate) is realities straightforward by following the introduction vignette. The package allows users to alter SS3 assessments in a relatively straightforward fashion,compared to editing the large .text files which SS3 assessments use. The other nice aspect of the package is there are three boiler plates, each mimicking a different fish life-history pattern. The species are Cod *Gadus morhua* , pacific anchovy *Engraulis mordax* and yellowtail founder *Pleuronectes ferruginea* .

I would recommend the package to anyone interested in fisheries simulation testing or with `{ss3sim}`. As a user who had no SS3 experience, I was able to alter the boiler plates and simulate the effect of having F set far higher than is suitable. The effect of this on a fishery over a time period (I chose 100 years) could then be observed.

References

Anderson, S.C., Monnahan, C.C., Johnson, K.F., Ono, K., Valero, J.L., 2014. ss3sim: An R Package for Fisheries Stock Assessment Simulation with Stock Synthesis. PLoS ONE 9, e92725. https://doi.org/10.1371/journal.pone.0092725

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Rudd, M.B., Cope, J.M., Wetzel, C.R., Hastie, J., 2021. Catch and Length Models in the Stock Synthesis Framework: Expanded Application to Data-Moderate Stocks. Frontiers in Marine Science 8, 663554. https://doi.org/10.3389/fmars.2021.663554