Population structure and inference of demography

Anders Gonçalves da Silva

Population and landscape genomics workshop – Day 2

25 March 2014

CBA – ANU

Goals

- To learn basic building blocs to succeed in analysing large population genetic datasets for inference of population structure and demography.

- By the end of the day, you should:

  - Understand the core theoretical underpinnings of population genetic structure and the coalescent
  - Have the tools to simulate your own data for FST and coalescent analysis
  - Understand what is a genealogy sampler and how it fits into the coalescent
  - Understand the importance of number of loci, length of loci, individuals and populations to estimate population genetic structure and in coalescent analysis
  - Understand the importance of the prior in Bayesian analysis, and how it will affect your results
  - See the potential in learning a programming language such as *R* or *Python*

Git Repository

- All data, code and presentations are at:

- https://github.com/andersgs/ canberra_workshop_day2

Web resources: bioinformatics

- R:

  – http://onepager.togaware.com
  – http://www.r-bloggers.com

- Python

  – http://software-carpentry.org/v4/python/

- Australian Bioinformatics Network:

  – http://australianbioinformatics.net

- COMBINE (An organisation for Australian research students in Computational Biology and Bioinformatics)

  – http://combine.org.au

Web resources: population genetics

- Evolution and genomics:

  – http://evomics.org

- Mary Kuhner's own presentation on the Coalescent:

  – http://evolution.gs.washington.edu/gs562/2011/kuhner.pdf

- Software tools:

  – http://research.amnh.org/users/koloko/softlinks/

- R population genetics:

  – http://cran.r-project.org/web/views/Genetics.html

Hard-copy resources

- Conner and Hartl (2004). A primer of ecological genetics. Sinauer.

- Crow and Kimura (1970). An introduction to population genetic theory. Blackburn Press. (reprinted in 2009).

- Hein, Schierup and Wiuf (2010). Gene genealogies, variation and evolution: a primer in coalescent theory. Oxford University Press.

- Wakeley (2009). Coalescent theory: an introduction. Roberts & Company.

- Haddock and Dunn (2010). Practical computing for biologists. Sinauer.

LET US TRY OUT RSTUDIO…