A novel approach combining Diffusion Approximation and Bayesian Skyline Plots for inferring demographic histories from SNP data

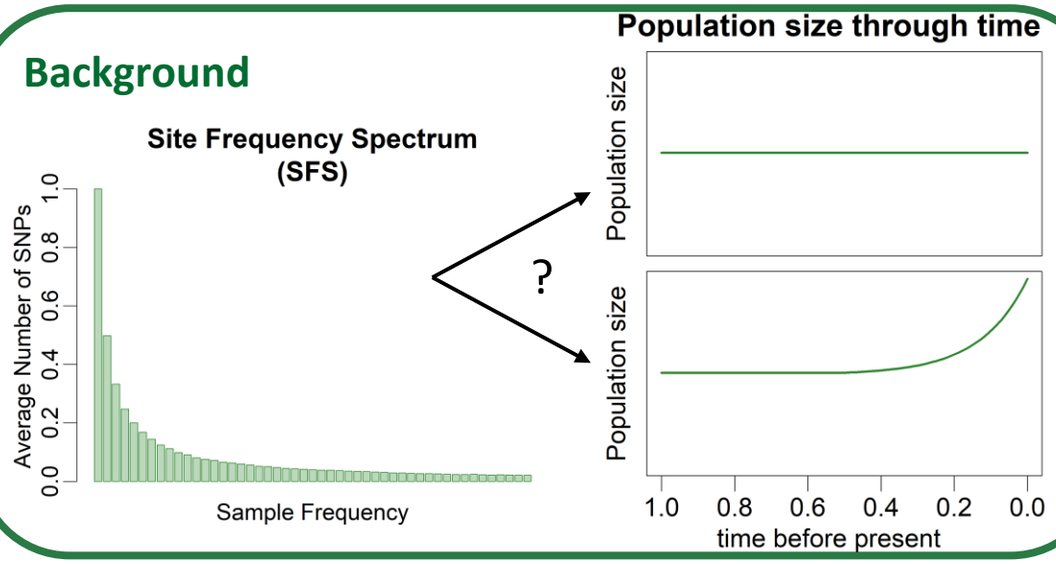
Ronja Jessica Billenstein[1, 2] & Sebastian Höhna[1, 2]

[1]GeoBio-Center LMU, [2]Department of Earth and Environmental Sciences, Palaeontology & Geobiology, Ludwig-Maximilians-Universität München, Munich, Germany

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

r.billenstein@lmu.de

Background



Motivation

Existing approach:
dadi (Diffusion Approximation for Demographic Inference, [1])

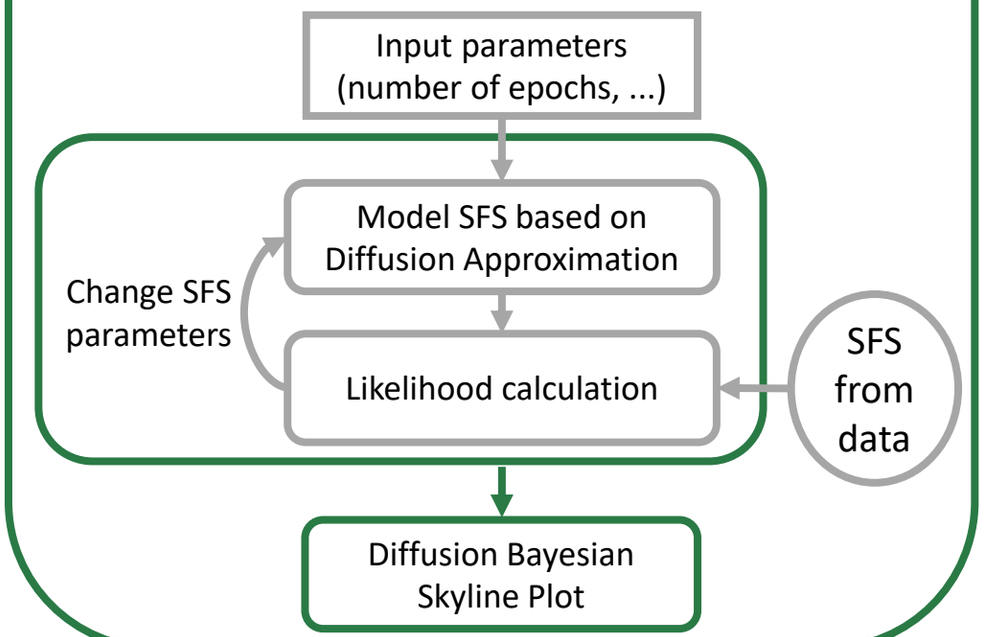
- Maximum Likelihood estimation of demographic history

Possible issues:

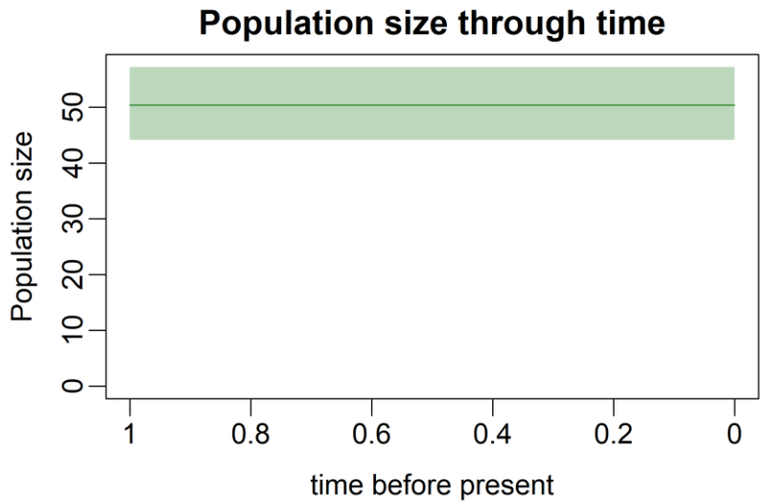
- Need to pre-specify demographic scenario
- No estimate of uncertainty

Diffusion Bayesian Skyline Plot (DBSP)

Incorporation of Diffusion Approximation into Bayesian Skyline Plot (BSP, [2]) framework



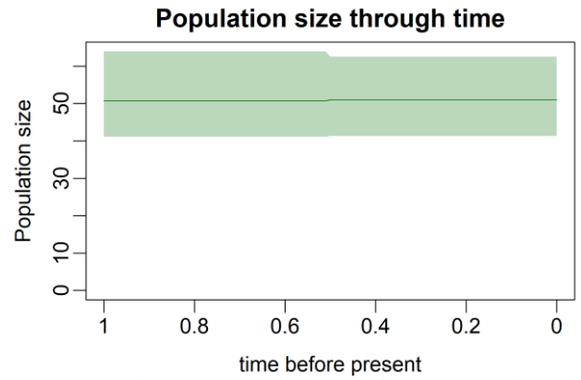
First Results – Simulations with a constant demographic history



DBSP with one epoch based on a simulated SFS with a constant population size of 50.

Future Directions

→ DBSP with more epochs for simulated data with various demographic histories



DBSP with two epochs based on a simulated SFS with a constant population size of 50.

HöhnaLab

Palaeontology & Geobiology LMU Munich

GeoBio-Center LMU Munich

References:
[1] RN Gutenkunst, RD Hernandez, SH Williamson, CD Bustamante "Inferring the joint demographic history of multiple populations from multidimensional SNP data" PLoS Genetics 5:e1000695 (2009)
[2] Drummond AJ, Rambaut A, Shapiro B & Pybus OG "Bayesian Coalescent Inference of Past Population Dynamics from Molecular Sequences " (2005) *Mol Biol Evol* **22**, 1185-1192.

Funded by DFG Deutsche Forschungsgemeinschaft German Research Foundation

Emmy Noether-Programm DFG