



A joint venture between The University of Melbourne and The Royal Melbourne Hospital

Constructing a Phylogenetic Tree

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Objectives

- Demonstrate how to construct and visualise a phylogenetic tree
- Steps:
 1. Align sequences using MAFFT Server
 2. Create an ML phylogeny using IQTREE Server
 3. Visualise using Nextstrain

MAFFT Server:

<https://mafft.cbrc.jp/alignment/server/index.html>

IQTREE Server: <http://iqtree.cibiv.univie.ac.at>

Warning – Web servers

Data is sent to the Osaka University (Japan) who operate the MAFFT server.

Data is sent to the Wien University (Germany) who operate the IQTREE server.

Alternatives if working with sensitive data:

- Use a local program like UGENE/MEGA, tutorial linked on course website.
- Install and run through command line (not covered).

Step 1: Align you sequences using MAFFT

Open the MAFFT server in your browser:

<https://mafft.cbrc.jp/alignment/server/index.html>

Demonstration on using MAFFT Server

Input:
Paste protein or DNA sequences in fasta format. [Example](#)

or upload a **plain text** file: No file chosen

☐ Use [DASH](#) to add homologous structures (protein only)

☒ Output original plus DASH sequences ☐ Output original sequences only

☐ Give structural alignment(s) externally prepared

☐ Allow unusual symbols (Selenocysteine "U", Inosine "i", non-alphabetical characters, etc.) [Help](#)

Step2: Align you sequences using IQTREE

Open the server in your browser:

<https://www.hiv.lanl.gov/content/sequence/IQTREE/iqtree.html>

Demonstration on using IQTREE Server

Input

Paste your alignment here
[Sample Input]

or upload your alignment file

Choose file No file chosen

Include HIV-1/SIVcpz subtype reference sequences ☐

Step3: Visualise Tree in Auspice

Open the webapp in your browser:

<https://auspice.us/>

Demonstration on using Auspice

Note: Auspice does NOT transmit data to any server. All computation after the website loads happens in your browser!

Questions? + Resources

- IQTree webserver tutorial:
 1. <https://www.iqtree.org/doc/Web-Server-Tutorial>
 2. <http://www.iqtree.org/doc/Web-Server-Tutorial>
- IQTree webserver paper:
 1. <https://academic.oup.com/bib/article/20/4/1160/4106928>
- Advanced – in depth CLI Tutorial:
 1. https://github.com/mmatschiner/tutorials/blob/master/multiple_sequence_alignment/README.md
 2. https://github.com/mmatschiner/tutorials/tree/master/ml_phylogeny_inference