treemaker: A Python tool for constructing a Newick formatted tree from a set of classifications.

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Summary

`treemaker` is a Python library to convert a text-based classification schema into a Newick file for use in phylogenetic and bioinformatic programs.

Research in linguistics or cultural evolution often produces or uses tree taxonomies or classifications. However, these are usually not in a format readily available for use in programs that can understand and manipulate trees. For example, the global taxonomy of languages published by the Ethnologue (Simons & Fennig, 2009) classifies languages into families and subgroups using a taxonomy string e.g. the language Kalam is classified as "Trans-New Guinea, Madang, Kalam-Kobon", while Mauwake is classified as "Trans-New Guinea, Madang, Croisilles, Pihom", and Kare is "Trans-New Guinea, Madang, Croisilles, Kare". This classification indicates that while all these languages are part of the Madang subgroup of the Trans-New Guinea language family, Kare and Mauwake are more closely related (as they belong to the Croisilles subgroup).

Other publications use a tabular indented format to demarcate relationships, such as the example in Figure 1 from Stephen Wurm's classification of his proposed Yele-Solomons language phylum (Wurm, 1975).

Both the taxonomy string and tabular format however are hard to load into software packages that can analyse, compare, visualise and manipulate trees. `treemaker` aims to make this easy by converting taxonomic data into Newick and Nexus (D. R. Maddison, Swofford, & Maddison, 1997) formats commonly used by phylogenetic manipulation programs.

Converting a Taxonomy to a Tree:

`treemaker` can convert a text file with a taxonomy to a tree. These taxonomies can easily be obtained from Ethnologue or manually entered, such as this example from Wurm's (outdated) classification of Yele-Solomons in Figure 1:

```
Bilua        Yele-Solomons, Central Solomon
Baniata      Yele-Solomons, Central Solomon
Lavukaleve   Yele-Solomons, Central Solomon
Savosavo     Yele-Solomons, Central Solomon
Kazukuru     Yele-Solomons, Kazukuru
Guliguli     Yele-Solomons, Kazukuru
Dororo       Yele-Solomons, Kazukuru
Yele         Yele-Solomons
```

```
      This gives the following picture of the composition of the Yele-
   Solomons Stock (9350¹):
   1)  The Central Solomon  Family    6850
           Bilua          4300
           Baniata         900
           Lavukaleve      700
           Savosavo        950²
   2)  The Kazukuru Family
       Kazukuru
       Guliguli
       Dororo
   3)  The Yele family-level Isolate 2500
```

Figure 1: Example of a language taxonomy in indented format from Wurm (1975).

`treemaker` can then generate a Newick representation:

```
((Baniata,Bilua,Lavukaleve,Savosavo),(Dororo,Guliguli,Kazukuru),Yele);
```

…which can then be loaded into phylogenetic programs to visualise or manipulate as in Figure 2.

`treemaker` has been used to enable the analyses in (Bromham, Hua, Cardillo, Schneemann, & Greenhill, 2018), and a number of forthcoming articles.

References

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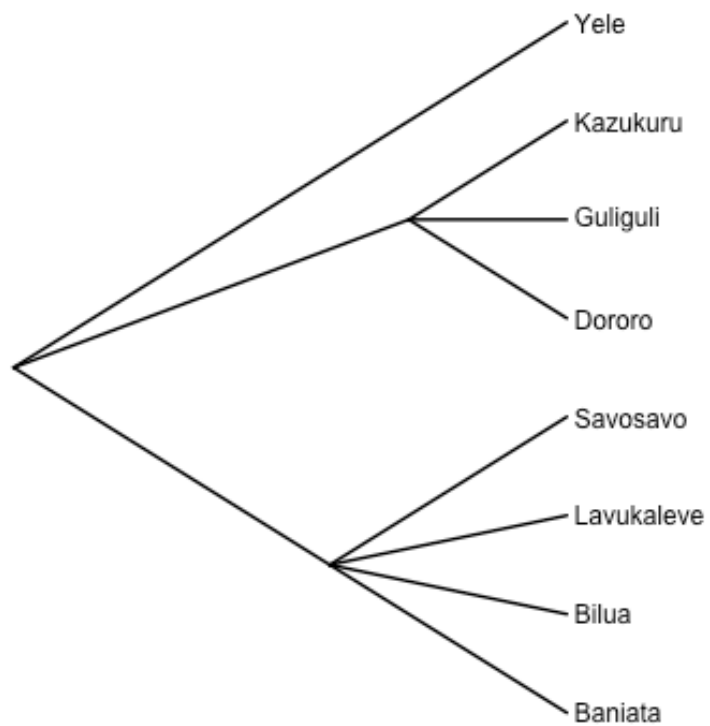
Figure 2: Tree visualisation of the relationships between the putative Yele-Solomons languages.