# Parse age distributions

*Version 1.0.0, by Giorgio Bianchini*

**Description**: Parses node age distributions from node attributes.

**Module type**: FurtherTransformation

**Module ID**: `15c955ce-bd4c-4a96-8cd3-b48d37aafc4c`

This module parses age distributions that have been annotated on the tree as attributes. For example, prior calibrations for node ages in some programs (e.g., `MCMCtree`) are stored as `Name`s on the tree.

The age distribution annotations generally consist of a distribution name, followed by the distribution's parameters in parentheses; for example, `Gamma(3,10)` represents a gamma distribution with $\alpha$ = 3 and $\beta$ = 10.

## Parameters

### Attribute

**Control type**: Attribute selector

**Default value**: Name

This parameter determines the attribute that this module parses into an age distribution.

### Scaling factor

**Control type**: Number spin box

**Default value**: 1

**Range**: [ 0, +$\infty$ )

This parameter is used to scale the age distributions (and the tree, if the Apply scaling to transformed tree check box is checked).

### Apply scaling to transformed tree

**Control type**: Check box

**Default value**: Checked

If this check box is checked, the scaling factor is applied to the transformed tree, as well as to the age distributions.

### Name

**Control type**: Text box

**Default value**: AgeDistributions

This parameter specifies a name that can be used to identify the age distributions in cases where multiple age distributions have been computed for the same tree.

### Apply

**Control type**: Button

This button applies the changes to the other parameter values and signals that the tree needs to be redrawn.

## Further information

The module currently supports the following distributions:

| Syntax | Distribution |
|---|---|
| • `>x`<br>• `L(x)`<br>• `L(x,p)`<br>• `L(x,p,c)`<br>• `L(x,p,c,t)` | Lower bound (as defined by PAML).<br><br>Parameter `x` represents the lower bound value. Parameters `p` (default 0.1) and `c` (default 1) control the shape of the distribution. Parameter `t` (default 0.025) is the weight of the left tail (i.e., the probability of values lower than the specified bound).<br><br>This is normally a soft bound, but you can set a low value (or `0`) for `t` to make it hard. |
| • `<x`<br>• `U(x)`<br>• `U(x,t)` | Upper bound (as defined by PAML).<br><br>Parameter `x` represents the upper bound value. Parameter `t` (default 0.025) is the weight of the right tail (i.e., the probability of values higher than the specified bound).<br><br>This is normally a soft bound, but you can set a low value (or `0`) for `t` to make it hard. |

| | |
|---|---|
| • `>a<b`<br>• `B(a,b)`<br>• `B(a,b,l)`<br>• `B(a,b,l,r)` | Lower and upper bound (as defined by PAML).<br><br>Parameters `a` and `b` represent the lower and upper bound values, respectively. Parameter `l` (default 0.025) is the weight of the left tail, and parameter `r` (default 0.025) is the weight of the right tail.<br><br>This is normally a soft bound, but you can set a low value (or `0`) for `l` and `r` to make it hard on either side or on both sides. |
| • `SN(l,s,p)` | Skew normal distribution (as defined by PAML).<br><br>Parameter `l` is the location of the skew normal, `s` is the scale, and `p` is the shape. |
| • `ST(l,s,p,d)` | Skew *t* distribution (as defined by PAML).<br><br>Parameter `l` is the location of the skew normal, `s` is the scale, `p` is the shape, and `d` is the degrees of freedom. |
| • `S2N(f,l1,s1,p1,l2,s2,p2)` | Mixture of two skew normal distributions (as defined by PAML). Parameter `f` is the weight for the first distribution (the weight for the second distribution is $1 - f$). The other parameters are the location, scale and shape for each of the two normal distributions. |
| • `G(a,b)`<br>• `Gamma(a,b)` | Gamma distribution with $\alpha$ = `a` and $\beta$ = `b`. |
| • `Normal(u,s)` | Normal distribution, where `u` is the mean and `s` is the standard deviation. |
| • `Exponential(l)` | Exponential distribution with $\lambda$ = `l`. |
| • *Other* | Other distributions defined in the `MathNet.Numerics.Distributions` namespace should work. Only distributions that implement the `IContinuousDistribution` interface are supported, but some of them will not be drawn because the heuristic to find the range of the distribution to plot fails - please open an issue on the TreeViewer GitHub repository if you would like a distribution in particular to work.<br><br>The syntax is the name of the distribution (as defined in `MathNet.Numerics.Distributions`), followed by the parameter(s) in parentheses (e.g., `Rayleigh(0.1)`). Names are case-insensitive. |