DPT

immediate

April 27, 2020

Contents

Diffusion Pseudo Time (DPT) is a pseudo time metric based on the transition probability of a diffusion process Haghverdi et al. (2016).
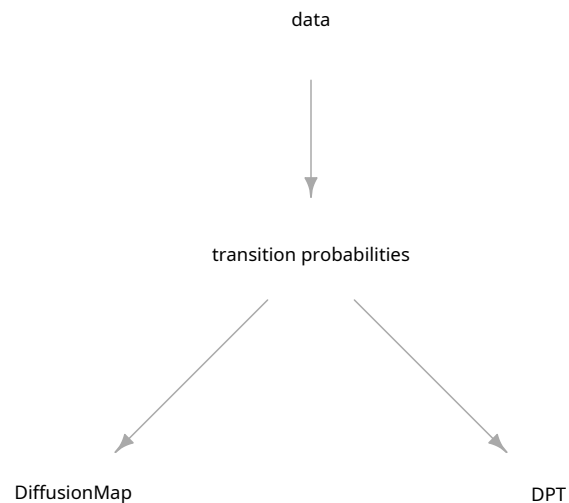
destiny supports DPT in addition to its primary function of creating `DiffusionMaps` from data.

```
[2]: library(destiny)      # load destiny...
     data(guo)             # ...and sample data
     library(gridExtra)    # Also we need grid.arrange
```

```
Registered S3 method overwritten by 'xts':
  method      from
  as.zoo.xts  zoo
```

DPT is in practice independent of Diffusion Maps:

However in order not to overcomplicate things, in *destiny*, you have to create DPT objects from `Diffu-sionMap` objects.
(If you really only need the DPT, skip Diffusion Component creation by specifying `n_eigs = 0`)
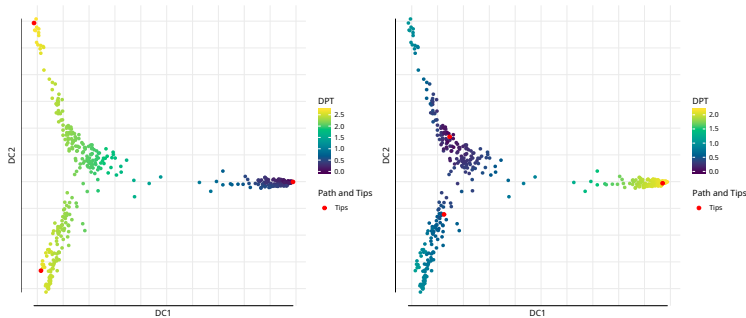
```
[4]: dm <- DiffusionMap(guo)
     dpt <- DPT(dm)
```

The resulting object of a call like this will have three automatically chosen tip cells. You can also specify tip cells:

```
[5]: set.seed(4)
     dpt_random <- DPT(dm, tips = sample(ncol(guo), 3L))
```
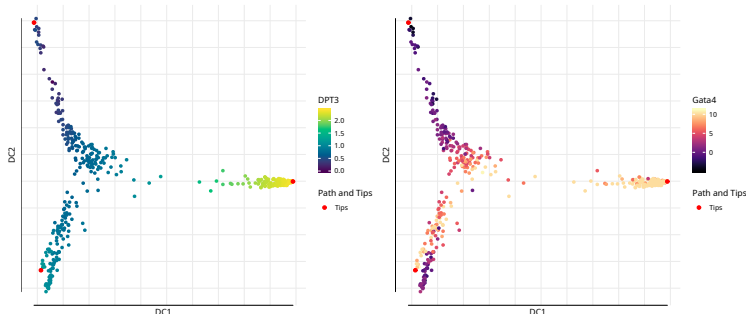
Plotting without parameters results in the DPT of the first root cell:

```
[7]: grid.arrange(plot(dpt), plot(dpt_random), ncol = 2)
```
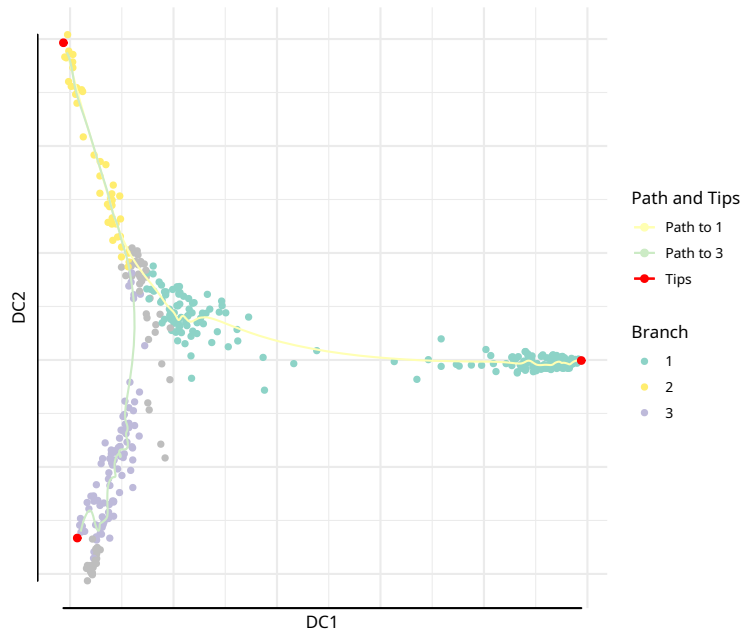

Other possibilities include the DPT from the other tips or everything supported by `plot.DiffusionMap`:

```
[8]: grid.arrange(
         plot(dpt, col_by = 'DPT3'),
         plot(dpt, col_by = 'Gata4', pal = viridis::magma),
         ncol = 2
     )
```


2

The DPT object also contains a clustering based on the tip cells and DPT, and you can specify where to draw paths from and to:

```
[10]: plot(dpt, root = 2, paths_to = c(1,3), col_by = 'branch')
```


You can further divide branches. First simply plot branch colors like we did above, then identify the number of the branch you intend to plot, and then specify it in a subsequent `plot` call. In order to see the new branches best, we specify a `dcs` argument that visually spreads out out all four branches.
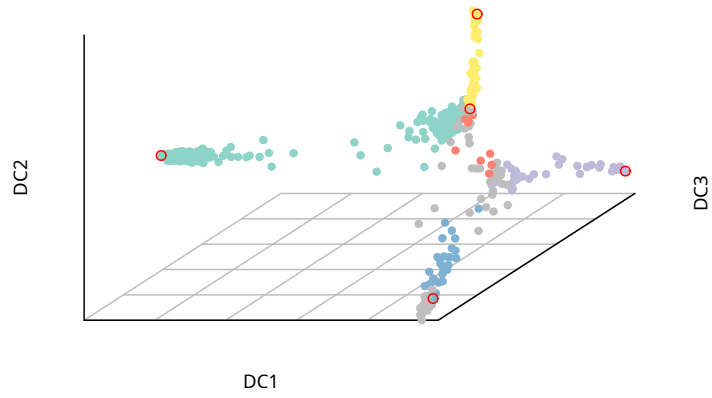
```
[11]: plot(dpt, col_by = 'branch', divide = 3, dcs = c(-1,-3,2), pch = 20)
```

```
Warning message in title(main, sub, ...):
""legend_name" ist kein Grafikparameter"
Warning message in plot.xy(xy.coords(x, y), type = type, ...):
""legend_name" ist kein Grafikparameter"
```

References

Haghverdi, L., M. Büttner, F. A. Wolf, F. Buettner, and F. J. Theis
    2016. Diffusion pseudotime robustly reconstructs lineage branching. *Nature Methods*.