With the addition of failure to diverge events and the ability of Jane to handle time zone information, the file 01_DP_approach.pdf is out of date. The following modifications should be made.

1 Notations

Add the following:

- Let cost_{FTD} be the cost of a failure to diverge event.
- Let $TZ : V_h \cup T \to \mathbb{N}$ be the function that takes a host node or time and returns its time zone such that the statement "v_h occurs at time t" implies $TZ(v_h) = TZ(t)$. Let $TZ : V_p \to [\mathbb{N}, \mathbb{N}]$ be the function that takes a parasite node and returns its time zone interval. If no time zone information is given then $TZ(t) = 1$ for all $t \in T$ and $TZ(v_p) = [1, 1]$ for all $v_p \in V_p$. If a parasite node has only one time zone then its interval will consist of one integer.
- Let NeedsFtd: $V_p \times V_h \to \{\top, \bot\}$ be the Boolean operator that determines whether the parasite tip $v_{p_{tip}} \in V_p$ infects a host in both subtrees v_{h_1} and v_{h_2} of $v_h \in V_h$.

2 Algorithm 1

2.1 Calculation of $B(e_p, e_h, t)$

2.1.1 Calculation of $B(e_p, e_h, t)$ for $t = n_h$

- Replace "If v_p and v_h are associated tips" with "If v_p and v_h are associated tips and $TZ(v_h) \in TZ(v_p)$"

2.1.2 Case 1

- Replace "v_h occurs at time t" with "v_h occurs at time t and there are no descendants $v_{p_{tip}}$ of v_p such that NeedsFtd$(v_{p_{tip}}, v_h)$"
- Replace "If v_p is not a tip" by "If v_p is not a tip and $TZ(t) \in TZ(v_p)$"
- Replace "If e_p is not a dummy root" by "If e_p is not a dummy root and no multihost parasites exist"

2.1.3 Case 2

- Re-index to Case 4

2.1.4 Case 3

- Re-index to Case 5

2.1.5 Case 2 (new)

- Add a new Case 2 with condition "v_h occurs at time t and there are exactly one descendant $v_{p_{tip}}$ of v_p such that NeedsFtd$(v_{p_{tip}}, v_h)$"
- Add the following text "If there exists some parasite tip $v_{p_{tip_2}} \neq v_{p_{tip}}$ descending from v_p and there exists some host v_{h_2} occurring at a time before v_h such that NeedsFtd$(v_{p_{tip_2}}, v_{h_2})$ then $B(e_p, e_h, t) = \infty$. Otherwise

$$B(e_p, e_h, t) = \min\{A(e_{p_{tip}}, e_{h_1}, t) + A(e_p, e_{h_2}, t), \\ A(e_{p_{tip}}, e_{h_2}, t) + A(e_p, e_{h_1}, t)\} + \text{cost}_{\text{FTD}}.$$

  The purpose of this condition can be explained as follows: If a descendant $v_{p_{tip_2}}$ of v_p has already failed to diverge at some earlier instance in time, e_p inherently must have the same identity as $v_{p_{tip_2}}$. For us to then have $v_{p_{tip}}$ fail to diverge would imply that e_p's identity is that of $v_{p_{tip}}$, a contradiction and thus we disallow the failure to diverge event."

2.1.6 Case 3 (new)

- Add a new Case 2 with condition "v_h occurs at time t and more than one descendant $v_{p_{tip}}$ of v_p satisfies NeedsFtd$(v_{p_{tip}}, v_h)$"
- Add the following text "In this case two distinct parasites must fail to diverge along the same parasite edge. This is impossible so we let $B(e_p, e_h, t) = \infty$"

2.2 Calculation of $A(e_p, e_h, t)$

2.2.1 Case 1

2.2.1.1 When computing DUP

- Replace "If v_p is not a tip" with "If v_p is not a tip and $TZ(t) = TZ(v_p)$"

2.2.1.2 When computing HS

- Replace "If v_p is not a tip" with "If v_p is not a tip and $TZ(t) = TZ(v_p)$"

2.3 Running time

- After "which can take as high as $O(n)$ running time." add "Moreover, we must check that the host switch is not prevented due to prior failure to diverge events. The document 'Restricting Host Switches' gives an explanation for how this is done and provides an algorithm for checking the validity of host switches in constant time."

3 Remainder of the document

The remainder of the document mainly discusses different techniques for optimizing Jane in special cases. There are a few instances where the description is out of date because of time zones or failure to diverge events but I have not mentioned them as they are largely repetitions of modifications already noted in this addendum.