Supporting Information

Analyzing Timber Trade in Brazil: assessing timber networks and supply chains

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k Most Likely Supply Chains Computation

Algorithm 1 describes the computation of the k most likely supply chains of a given timber company $v \in V_c \cup V_e$. As detailed in the main manuscript, V_f V_c, and V_e account for the set of nodes representing forest concessions, timber companies, and end consumers, respectively. E and W are the directed edge set and corresponding weights of a Timber Trade Network - TTN.

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Algorithm 1 k-most likely supply chains

Require: $G_{\mathcal{S}} = \{V_f \cup V_c \cup V_e, E, W\}$; $v \in V_c \cup V_e$; k

Flip edges' directions and the sign of their corresponding volumes

$\mathcal{C} \leftarrow \emptyset$ ▷ $\mathcal{C}$ holds the most likely chains
$C \leftarrow$ Dijkstra($G_{\mathcal{S}}$,v) ▷ Shortest chains with greatest volume from v to each forest concession
$C \leftarrow sort(C)$ ▷ Sort chains in ascending order of negative volumes; $C[i][0]$ corresponds to v and $C[i][-1]$ to a forest concession $v_f \in V_f$ in the i-th chain $C[i]$, $i = 0, \ldots, |C| - 1$; $|C|$ is the number of chains in C.
$count \leftarrow 0$
if $k > |C|$ **then**
  $k \leftarrow |C|$
end if
$i \leftarrow 0$
while $count < k$ **do**
  $\mathcal{C} \leftarrow \mathcal{C} \cup C[i]$ ▷ Add the likely chain $C[i]$ to $\mathcal{C}$
  $count \leftarrow count + 1$
  $i \leftarrow i + 1$
  $P \leftarrow$ Eppstein($G_{\mathcal{S}}$,C[i-1][0],C[i-1][-1],k) ▷ P holds the k-shortest chains with greatest volume from $C[i-1][0]$ to $C[i-1][-1]$
  $P \leftarrow sort(P)$ ▷ Sort chains from P in ascending order of negative volumes
  $j \leftarrow 1$
  while $\sigma(P[j]) < \sigma(C[i])$ and $count < k$ **do** ▷ $\sigma(\cdot)$ is the total volume of the chain
    $\mathcal{C} \leftarrow \mathcal{C} \cup P[j]$ ▷ Add the likely "secondary" chain $P[j]$ to $\mathcal{C}$
    $count \leftarrow count + 1$
    $j \leftarrow j + 1$
  end while
end while
return($\mathcal{C}$)