Contraction Algorithm for RDLT

Algorithm 1 Matrix-based MCA Phase 1: Contraction Path Generation

Given RDLT R; Pre-processing Steps:
Input: Expanded vertex simplification R_i of RDLT R
Output: Contraction Path P
Matrices: RV^t_{adj} and RV^t_{C}

Initialize Arc Connectivity Matrix RV^0_{adj} of R_i
Initialize C-Attribute Matrix RV^0_{C} of R_i
Let $s' \in V_i$ be the source and $f' \in V_i$ be the sink
Let $x = s'$
Initialize $P = \{x\}$
Let $t = 1$
while P does not contain f' **do**
    $\mathcal{Y} \leftarrow \{y \in V_i \mid RV^{t-1}_{\text{adj}}(x, y) \geq 1\}$
    Select any $y \in \mathcal{Y}$
    Let LHS $= RV^{t-1}_C(x, y) \cup \{\epsilon\}$
    $\mathcal{U} \leftarrow \{u \in V_i \mid u \neq x \wedge (RV^{t-1}_{\text{adj}}(u, y) \geq 1)\}$
    Let RHS $= \bigcup_{u \in \mathcal{U}} RV^{t-1}_C(u, y)$
    if LHS $\supseteq$ RHS **then**
        Update $RV^{t-1}_C(u, y) = \epsilon, \forall (u, y) \in E_i, u \neq x$
        for all $u \in \mathcal{U}$ **do**
            $RV^{t-1}_C(u, y) = \epsilon$
        end for
        Let $z = x \wedge y$
        Let $z = xy$ = Matrix Addition of rows (columns) x and y in RV^{t-1}_{adj}
        for all $w \in V_i$ **do**
            RowMerge_Adj: $RV^t_{\text{adj}}(z, w) = RV^{t-1}_{\text{adj}}(x, w) + RV^{t-1}_{\text{adj}}(y, w)$
            ColMerge_Adj: $RV^t_{\text{adj}}(w, z) = RV^{t-1}_{\text{adj}}(w, x) + RV^{t-1}_{\text{adj}}(w, y)$
        end for
        Let $z = xy$ = Element-wise Set Union of rows (columns) x and y in RV^{t-1}_C
        for all $w \in V_i$ **do**
            RowMerge_C: $RV^t_C(z, w) = RV^{t-1}_C(x, w) \cup RV^{t-1}_C(y, w)$
            ColMerge_C: $RV^t_C(w, z) = RV^{t-1}_C(w, x) \cup RV^{t-1}_C(w, y)$
        end for
        $V_i = (V_i \setminus \{x, y\}) \cup \{z\}$
        Create RV^t_{adj} as an $m \times m$ matrix where $m = n - t$ and as the submatrix of RV^{t-1}_{adj} with rows and columns indexed by updated vertex set V_i of R_i
        Create RV^t_C as an $m \times m$ matrix where $m = n - t$ and as the submatrix of RV^{t-1}_C with rows and columns indexed by updated vertex set V_i of R_i
        Let $x = z$
        Let $P = P \cup \{y\}$
        Let $t = t + 1$
    end if
end while
return P