Algorithm 3. Update-DAG$(s, \mathbf{w}'(u,v))$

Input: DAG(s), DAG(v), and $flag(s,t), \forall t \in V$.

Output: An edge set H after decrease of weight on edge (u,v), and $P'_s(t), \forall t \in V - \{s\}$.

1: $H \leftarrow \emptyset$.
2: **for** each $v \in V$ **do** $P'_s(v) = \emptyset$.
3: **for** each edge $(a,b) \in$ DAG(s) and $(a,b) \neq (u,v)$ **do**
4: **if** $flag(s,b) =$ UN-changed or $flag(s,b) =$ NUM-changed **then**
5: $H \leftarrow H \cup \{(a,b)\}$ and $P'_s(b) \leftarrow P'_s(b) \cup \{a\}$.
6: **for** each edge $(a,b) \in$ DAG(v) **do**
7: **if** $flag(s,b) =$ NUM-changed or $flag(s,b) =$ WT-changed **then**
8: $H \leftarrow H \cup \{(a,b)\}$ and $P'_s(b) \leftarrow P'_s(b) \cup \{a\}$.
9: **if** $flag(s,v) =$ NUM-changed or $flag(s,v) =$ WT-changed **then**
10: $H \leftarrow H \cup \{(u,v)\}$ and $P'_s(v) \leftarrow P'_s(v) \cup \{u\}$.