Trust is Risk: Generalized Max Flow for Strategies between Idle and Conservative

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Abstract. Previous versions of Trust is Risk present the Conservative and the Idle strategy as distinct and unrelated. This work is an attempt to generalize this idea into a continuous spectrum of strategies, the two ends of which correspond to the two previously defined strategies. Prior to querying the system for an indirect trust towards Bob, Alice can attribute a specific expected strategy to each one of the participating players, or even fine-tune the response of each player to a steal action from each one of the players she directly trusts. The system then executes the generalized MaxFlow [1] to determine the indirect trust from Alice to Bob, given the specified strategies of the rest of the players.

The generalized MaxFlow algorithm expects as input a graph with capacities as well as a *gain factor* for each edge, which in our case will be a number in $[0, 1]$. Intuitively, the gain factor of an edge (v, w) represents the ratio of "leakage" this edge causes. In our case, it represents the percentage of funds that v will try to replenish when w steals from her. For the sake of example, consider the following graph:

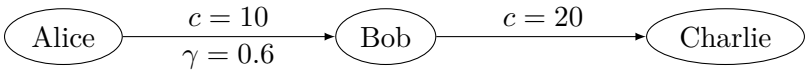

Fig. 1: Alice trusts Charlie 6

A gain factor of 0 means that v will tolerate any amount of stolen funds by w without trying to replenish them by stealing others that directly trust her, whereas a gain factor of 1 means that v will try to replenish any amount of stolen funds by w. If the gain factor is 0 on edges (v, w) for all $w \in \mathcal{V}$, then v is following the Idle strategy, whereas if the gain factor is 1 on edges (v, w) for all $w \in \mathcal{V}$, then v is following the Conservative strategy. No gain factors should be added for the Evil player, since she is considered to steal all her incoming direct trust.

References

1. Wayne K. D., Tardos E.: Generalized Maximum Flow Algorithms. Ph.D. thesis: Cornell University (1999)