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Degree distribution, rank-size distribution, and leadership persistence in mediation-driven attachment networks

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Cover letter and Highlights

The Highlights:

1. we have proposed a mediation driven attachment model and we have given an exact analytical expression for its attachment rule namely the mediation-driven attachment probability Π.

2. When the incoming come with small edges (m) we find that the dyamics of the resulting network is governed by the *winner takes it all effect. However, in the large m limit it becomes almost like BA networks.*

3. We show that the degree distribution exhibits power-law with a spectrum of exponents $2 \leq \gamma \leq 3$ depending on m value. This is in sharp contrast with BA networks where the exponent is strictly equal to 3.

4. We have shown that the rank-size distribution can help appreciate the difference between MDA an d BA network.

5. Finally and most importantly, we investigate for the first time, to the best of our knowledge, the leadership persistence probability $F(\tau)$, the probability that the node with the maximum degree retains its leadership (maximum degree) up to time τ, for the first time in the context of network theory. We show that $F(\tau)$ decays following power-laws in both MDA and BA models. However, in the case of MDA networks, the persistence exponent remains almost constant independently of m, and in the case of BA models it rises exponentially to a constant.

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