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Cascades in the Threshold Model with Multiple Initiators and Heterogeneous Threshold Values¹ P. KARAMPOURNIOTIS, S. SREENIVASAN, B.K. SZYMANSKI, G. KORNISS, Rensselaer Polytechnic Institute — The threshold model (TM) is a classical opinion diffusion model, under which a node adopts an opinion only when its threshold is lower than the fraction of its neighbors already possessing that opinion. The TM has been thoroughly investigated for uniform thresholds with small sizes (< 0.01) of initially active nodes (initiators) (Watts, 2002) and with multiple initiators (Singh, 2013). However, a model with uniform threshold does not capture the complex nature of social influencing when multiple initiators are present. We find that for sufficiently large spread in the threshold distribution, the tipping point in the social influencing process disappears and crosses over to a smooth transition governed by the size of initiators. Specifically, we study cascades in the TM when nodes are assigned a threshold value drawn from the Normal Distribution with varying mean threshold φ and standard deviation σ . We analyze both synthetic and empirical networks using different sizes of initiators. We observe a non-monotonic change in the cascade size for varying σ that for small initiator sizes follows Watts Cascade Condition. In addition, we find that, unlike the case of uniform thresholds, for large enough σ , a critical initiator size beyond which cascades become global ceases to exist.

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