On metrics and models for multiplex networks

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Stellingen

behorend bij het proefschrift

On metrics and models
for multiplex networks

1. Adopting proper null models for multiplex networks, enforcing constraints taking into account the heterogeneity of the layers, is required in order to suitably model such real-world systems.

   [Chapter 1]

2. Inter-layer coupling is the ultimate reason why layers of a multiplex should be analyzed together, rather than separately.

   [Chapter 2]

3. The multiplexity and multireciprocity matrices allow us to reconstruct the joint connection probabilities from the marginal ones, hence bridging the gap between single-layer information and truly multiplex properties.

   [Chapter 3]

4. Networks provide an informative yet non-redundant description of complex systems only if links represent truly dyadic relationships that cannot be directly traced back to node-specific properties such as size, importance, or coordinates in some embedding space.

   [Chapter 4]

5. As illustrated by Peel *et al.*, using metadata associated to the nodes as ground truth can lead to incorrect scientific conclusions.

   [L. Peel *et al.*, Sci. Adv. **3**, e1602548 (2017)]

6. The currently available notion of multilinks proposed by Bianconi is not appropriate to model several multiplex networks observed in the real world.

   [G. Bianconi, Phys. Rev. E **87** (6), 062806 (2013)]

7. The interlayer degree correlation function defined in Nicosia *et al.* is not sufficient to capture the genuine coupling between layers of a multiplex, as it is biased by their degree distributions.

   [V. Nicosia *et al.*, Phys. Rev. Lett. **111** (5), 058701 (2013)]

8. Since the network filter proposed by Serrano *et al.* is not maximum-entropy based, in my opinion that method is not guaranteed to be unbiased.

   [M.A. Serrano *et al.*, Proc. Nat. Ac. Sc. USA **106** (16), 6483 (2009)]

9. Learning to ask for help is the greatest achievement.

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Valerio Gemmetto
Leiden, 16 Januari 2018

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