Predictability in Psychopathological Network Models

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Psychopathological Symptom Network

- Agitated
- Guilty
- Worrying
- Worthless
- Interests
- Insomnia
Psychopathological Symptom Network

Detect most *influential* node
Psychopathological Symptom Network

Detect most *determined* node
Intervention on Insomnia via Network?

Patient A

Patient B
How self-determined is a Symptom Network?

Small External Field

Large External Field
Nodewise Predictability

Predictability of node $A$ is the extent to which we can predict $A$ by its neighbors $N(A)$.

Two steps:

1. Make predictions
   \[ \hat{A} = f(N(A)) \]

2. Compute prediction error
   \[ \text{error}(A, \hat{A}) \]
Computing Nodewise Predictability

- Agitated
- Guilty
- Worrying
- Worthless
- Interests
- Insomnia
Computing Nodewise Predictability

- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia

Diagram:

- Guilty -> Insomnia
- Agitated -> Insomnia
- Worthless -> Insomnia
- Interests -> Insomnia
- Worrying -> Insomnia
Computing Nodewise Predictability

- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia
- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia
Computing Nodewise Predictability

- Agitated
- Worthless
- Interests
- Guilty Worrying
- Insomnia
- Worrying
Computing Nodewise Predictability

- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia

Diagram:
- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia

Relationships:
- Guilty → Agitated → Insomnia
- Worrying → Worthless
- Interests → Worthless
- Agitated → Worthless
- Insomnia → Worthless
Computing Nodewise Predictability

- Guilty
- Agitated
- Interests
- Worthless
- Insomnia
- Worrying
Computing Nodewise Predictability

- Guilty
- Worrying
- Worthless Interests
- Agitated
- Insomnia

Diagram:
- Guilty
- Worrying
- Worthless Interests
- Agitated
- Insomnia
Computing Nodewise Predictability

- Guilty
- Worrying
- Worthless
- Interests
- Agitated
- Insomnia

Diagram:
- Insomnia is connected to:
  - Guilty
  - Worrying
  - Agitated
  - Worthless
  - Interests
Visualizing Nodewise Predictability

Insomnia

Agitated

Guilty

Worthless

Interests

Worrying
Predictability = Upper Bound
What we can (not) compute

How much is node A determined by all other nodes?

YES

How much does A influence (all) other nodes?

NOPE

*Behavior Research Methods.*
First peak into Predictability in Psychopathological Networks

Haslbeck & Fried (in press) How predictable are symptoms in psychopathological networks? A reanalysis of 18 published datasets

Psychological Medicine.
Predictability in Psychopathological Network Models

Summary

- Predictability = degree to which a node is determined by its neighbors (on absolute scale)
- Clinical practice: helps to judge relevance of edges and to select treatments
- Research: gives an idea about degree of self-determination and controllability

Contact:

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backup
Relationship between Centrality and Predictability