INFERENCE ON/IN/OF NETWORKS

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Introduction

At the turn of the 21st century scientists have come to realise that a major ingredient in many modern economic, epidemiological, ecological and biological questions is to understand the **network structure** of the entities they study. Unfortunately, computational bottle-necks have meant that only the simplest analyses have been applied to these large datasets, whereas methodological bottle-necks prevented an integrative view of complex phenomena.

Rather than simplifying the methodology prior to seeing the data, modern techniques from **high-dimensional inference** allow the data to select the appropriate level of complexity. The aim of this project is to apply these techniques to the field of network analysis.

We approach networks from three different angles:

1. high-dimensional graphical models, including causal models,
2. ordinary and stochastic differential equations
3. random network models, such as stochastic block models and ERGMs.

Our aim is to develop theoretically sound network inference techniques based on penalized inference. In each of these areas, the challenge is to define a sufficiently complex network models for large systems that have computationally tractable inference procedures.

Box 1

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ER2 Nullam sagittis cursus neque, sit amet mollis elit auctor in. Etiam sed lectus a nulla rhoncus interdum a tempus nunc. Sed at eleifend purus.

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$$\cos^3\theta = \frac{1}{4}\cos\theta + \frac{3}{4}\cos 3\theta \tag{1}$$

Vivamus porta lacus et lectus **porta lacus**. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis. torte G_t hac millis **plates** Idk

Box 3

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Treatments	**Response 1**	**Response 2**
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 1: Table caption

Box2

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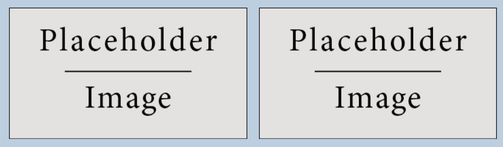

Figure 1: Figure caption 1 (left); Figure caption 2 (right)

1. Cras ac ipsum eu nisl imperdiet interdum nunc bibendum, est in pulvinar facilisis, mi purus fringilla tellus, eu varius ipsum ante laoreet ipsum
2. Sed cursus erat quis odio laoreet facilisis maecenas vehicula

Box 4

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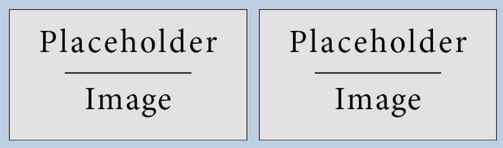

Figure 2: Figure caption 1 (left); Figure caption 2 (right)

Aliquam ac justo lectus. Nunc ultrices aliquet purus non dictum. Nulla facilisi. Quisque vitae urna non purus sollicitudin venenatis. Aliquam erat volutpat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. In hendrerit tortor sed massa consequat eu viverra justo porta. Ut nec felis sem, non elementum.