

# Modelling and Analysis of Complex Networks

## Exercise 7

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### (a) What characterizes the original CODA model?

**Answer:** The CODA model consists of three parts:

- 1) CODA models opinions as unobservable and continuous variables bounded between 0 and 1.
- 2) In the CODA model individuals have binary actions that are observable.
- 3) Individuals update opinions by incorporating peer behavior using a Bayesian update rule.<sup>[1]</sup>
  - i) The CODA model for opinion dynamics is altered, with the introduction of trust effects.
  - ii) Trust is dynamically updated together with the opinion.
  - iii) Two phases are observed, disagreement or consensus appearing depending on the parameters.
  - iv) When there is more trust, consensus is more easily achieved.
  - v) Opinion evolves much faster than the trust matrix.<sup>[2]</sup>

### (b) Why is CODA a hybrid model?

**Answer:** CODA model is a hybrid model cause here agents show discrete behavior regarding their actions but have continuous opinions that are updated by interacting with other agents is presented. In other word, Continuous Opinions and Discrete Action (CODA) model is a mixed version model where the continuous values are not observed and only a discrete choice is known by the neighbors. CODA model variations have been shown to be equivalent to the continuous models<sup>[3]</sup> as well as a general case to the discrete models in the literature.<sup>[4]</sup>

### (c) How to update opinions?

**Answer:** Individuals update opinions by incorporating peer behavior using a Bayesian update rule. Opinion dynamics models<sup>[5]</sup> are usually built on the idea that each agent will influence others, either all of them, if one assumes a complete graph of connections, or a set of all agents that compose its neighborhood. In the most common case, agents somehow change their opinions towards the opinion of those neighbors, either by a simple imitative process in discrete models<sup>[6]</sup>,<sup>[7]</sup>,<sup>[8]</sup>,<sup>[9]</sup> or moving the values of their

opinion in the direction of the value of the neighbor opinion, in the continuous models [\[10\]](#), [\[11\]](#).

#### **(d) What are the recent extensions of CODA?**

**Answer:** Some recent extensions of CODA models are including dimensionless model for symmetrical case [\[12\]](#), trust effects in CODA, extremism using local reinforcement.

#### **Reference:**

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