

# Training of boolean logic models of signalling networks to time course data with *CNORdt*

Aidan MacNamara

March 13, 2012

## Contents

<b>1</b>	<b>Background</b>	<b>1</b>
<b>2</b>	<b>CNORdt</b>	<b>1</b>
<b>3</b>	<b>Load Data</b>	<b>1</b>
<b>4</b>	<b>Preprocessing</b>	<b>2</b>

## 1 Background

This software is written in the R language, so in order to use it you will need to have R installed on your computer. For more information, please refer to <http://www.r-project.org/>. For more information about how to install R packages, please refer to <http://cran.r-project.org/doc/manuals/R-admin.html#Installing-packages>.

CNORdt is an add-on to CellNOptR. CellNOptR trains logic models to data, more details and the package itself can be found using the following command to install:

CNORdt can be installed by:

Or, using the R GUI, click on 'Packages & Data', then 'Package installer' and choose local source from the dropdown menu. Then click 'install', choosing *CNORdt\_1.0.0.tar.gz* and finally clicking 'open'.

## 2 CNORdt

CNORdt introduces a scaling parameter that defines the time scale of the Boolean synchronous simulation. Where each 'tick' ( $t$ ) (or simulation step) is the synchronous updating of all nodes in the model according to their inputs at  $t - 1$ , the scaling parameter defines the 'tick' frequency relative to the time scale of the real data. Although this is a crude approach (i.e. it implies a single rate across all reactions), it allows us to fit a synchronous Boolean simulation to data. Hence, all data points can be fitted to the model and hyperedges that cause feedback in the model can be included, which allows the model to reveal more complex dynamics such as oscillations.

## 3 Load Data

The first step of the analysis with *CNORdt* is to load the necessary libraries and the data:

The model and data are then loaded:

## 4 Preprocessing

‘sectionOptimization