EFFICIENT UNFOLDING OF COLOURED PETRI NETS WITH INTERVAL DECISION DIAGRAMS

SCHWARICK - ROHR - LIU - ASSAF - CHODAK - HEINER
BRANDENBURG TECHNICAL UNIVERSITY COTTBUS-SENFTENBERG
COMPUTER SCIENCE INSTITUTE
HTTPS://WWW-DSSZ.INFORMATIK.TU-COTTBUS.DE
EFFICIENT UNFOLDING OF COLOURED PETRI NETS WITH INTERVAL DECISION DIAGRAMS

SCHWARICK - ROHR - LIU - ASSAF - CHODAK - HEINER

BRANDENBURG TECHNICAL UNIVERSITY COTTBUS-SENFTENBERG
COMPUTER SCIENCE INSTITUTE
COLOURED PETRI NETS

WHAT FOR?
THE SIR MODEL
[https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SIR_model]


THE SIR MODEL

[ https://en.wikipedia.org/wiki/Compartmental_models_in_epidemiology#The_SIR_model ]

---

monika.heiner@b-tu.de  June 2020
Epidemic -> Pandemic Modelling

Joint work with David Gilbert, Shannon Connolly, Brunel University, London

monika.heiner@b-tu.de

June 2020
JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON
Epidemic -> Pandemic Modelling

Joint work with David Gilbert, Shannon Connolly, Brunel University, London
EPIDEMIC -> PANDEMIC MODELLING

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de
EPIDEMIC -> PANDEMIC MODELLING

JOIN WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de

June 2020
EPIDEMIC -> PANDEMIC MODELLING

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de

June 2020
AND THEN THERE WAS COLOUR
colorsets:
    enum Nodes = {AT, CH, DE, FR, IT};
variables:
    Nodes : x, y;

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON
PANDEMIC MODELLING WITH COLOURED NETS

colorsets:
enum Nodes = {AT, CH, DE, FR, IT};
Matrix = PROD (Nodes, Nodes);
Connections = Matrix [ (x=AT & (y=CH | y=DE | y=IT) | 
(x=CH & (y=AT | =E | y=FR | y=IT) | . . . ];

9000`AT++
8000`CH++
83000`DE++
65000`FR++
60000`IT++

colorfunction:
bool connected (Nodes p, Nodes q) { (p,q) elemOf Connections };

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de
PANDEMIC MODELLING WITH COLOURED NETS

Recovered_AT
Recovered_CH
Recovered_IT
Recovered_FR

Infected_AT
Infected_CH
Infected_IT
Infected_FR

Susceptible_AT
Susceptible_CH
Susceptible_IT
Susceptible_FR

Infect
Recover

9000 AT++
8000 CH++
83000 DE++
65000 FR++
60000 IT++

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de
June 2020
PANDEMIC MODELLING WITH COLOURED NETS

Susceptible_AT: 9,000
Susceptible_BE: 11,000
Susceptible_CH: 8,000
Susceptible_DE: 83,000
Susceptible_DK: 5,000
Susceptible_ES: 46,000
Susceptible_FR: 65,000
Susceptible_IT: 60,000
Susceptible_NL: 17,000
Susceptible_PT: 10,000

Recovered_AT: 100
Recovered_BE: 140
Recovered_CH: 128
Recovered_DE: 112
Recovered_DK: 294
Recovered_ES: 230
Recovered_FR: 198
Recovered_IT: 160
Recovered_NL: 363
Recovered_PT: 318

Infect_AT: 1
Infect_BE: 1
Infect_CH: 1
Infect_DE: 1
Infect_DK: 1
Infect_ES: 1
Infect_FR: 1
Infect_IT: 1
Infect_NL: 1
Infect_PT: 1

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON

monika.heiner@b-tu.de  June 2020
WHAT NEEDS TO BE CHANGED:

COLOUR SETS + INITIAL MARKING
SIMULATING AND ANALYSING PANDEMIC MODELS

JOINT WORK WITH DAVID GILBERT, SHANNON CONNOLLY, BRUNEL UNIVERSITY, LONDON
How to unfold efficiently?

www-dssz.informatik.tu-cottbus.de