Thomas Chatain and Loïc Paulevé
chatain@lsv.fr and loic.pauleve@lri.fr

This form is a summary description of the model entitled "MAPKbis" proposed for the Model Checking Contest @ Petri Nets. Models can be given in several instances parameterized by scaling parameters. Colored nets can be accompanied by one or many equivalent, unfolded P/T nets. Models are given together with property files (possibly, one per model instance) giving a set of properties to be checked on the model.

Description

This model is extracted from a set presented in [1] and modeling biological systems, obtained from influence graphs provided by biologists. This particular Petri net describes a Boolean model of Mitogen-Activated Protein Kinase network [2] (MAPK). It is a different model from the variant proposed in this contest in 2011.

References

1. Loïc Pauleve, "Reduction of Qualitative Models of Biological Networks for Transient Dynamics Analysis", https://hal.archives-ouvertes.fr/hal-01580765
2. L. Grieco, L. Calzone, I. Bernard-Pierrot, F. Radvanyi, B. Kahn-Perls, and D. Thieffry, Integrative modelling of the influence of MAPK network on cancer cell fate decision, *PLoS Comput Biol*, vol. 9, no. 10, p. e1003286, oct 2013.

Scaling parameter

Parameter name	Parameter description	Chosen parameter values
$n1, n2, n3$	setting parameters	$(53, 1, 0), (53, 2, 0)$

Size of the model

Although the model is parameterized, its size does not depend on parameter values.

number of places:	106
number of transitions:	173
number of arcs:	986

Structural properties

ordinary — *all arcs have multiplicity one* ..... ✔
simple free choice — *all transitions sharing a common input place have no other input place* ..... ✘
extended free choice — *all transitions sharing a common input place have the same input places* ..... ✘
state machine — *every transition has exactly one input place and exactly one output place* ..... ✘
marked graph — *every place has exactly one input transition and exactly one output transition* ..... ✘
connected — *there is an undirected path between every two nodes (places or transitions)* ..... ?
strongly connected — *there is a directed path between every two nodes (places or transitions)* ..... ?
source place(s) — *one or more places have no input transitions* ..... ?
sink place(s) — *one or more places have no output transitions* ..... ?
source transition(s) — *one or more transitions have no input places* ..... ?
sink transitions(s) — *one or more transitions have no output places* ..... ?
loop-free — *no transition has an input place that is also an output place* ..... ✘
conservative — *for each transition, the number of input arcs equals the number of output arcs* ..... ✔
subconservative — *for each transition, the number of input arcs equals or exceeds the number of output arcs* ..... ✔
nested units — *places are structured into hierarchically nested sequential units*[(a)] ..... ?

[(a)] the definition of Nested-Unit Petri Nets (NUPN) is available from http://mcc.lip6.fr/nupn.php

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Behavioural properties

safe — *in every reachable marking, there is no more than one token on a place* ..... ✔
deadlock — *there exists a reachable marking from which no transition can be fired* ..... ?
reversible — *from every reachable marking, there is a transition path going back to the initial marking* ..... ?
quasi-live — *for every transition t, there exists a reachable marking in which t can fire* ..... ?
live — *for every transition t, from every reachable marking, one can reach a marking in which t can fire* ..... ?