A deadlock prevention policy for a class of timed Petri nets based on transition priority

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Petri nets have been recognized as a powerful, graphical, and mathematical tool and widely used to model flexible manufacturing systems (FMS). To solve the problem of deadlock prevention for timed Petri nets (TdPN), an effective deadlock prevention policy based on the transition priority is presented in this poster. By analyzing reachability graphs of TdPN, a new class of TdPN named TdS^3PRC is defined. Three algorithms are proposed based on a new definition named timed Petri nets with priorities (TdPNWP). Algorithm 1, named C-class algorithm, is used for judging whether a TdS^3PR is a TdS^3PRC. Algorithm 2, named C-free algorithm, makes a TdS^3PRC deadlock-free. And algorithm 3, named C-live algorithm, makes a TdS^3PRC live. Finally, a parameterized example is used for demonstrating the application of the proposed policy.

Timed discrete event models for hierarchical controllers of urban traffic

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This poster considers efficient hierarchical control of large urban networks, partitioned in smaller geographical regions. Efficient models and performance analysis tools that enable the synergistic design of local or regional control of the switching times of traffic lights in each region on the one hand, and perimeter control at the boundaries of regions at a slower time scale, on the other hand, is proposed in this poster. At the same time the poster illustrates the interaction between the discrete event models used for the control of red/green switching times, at the time scale of cycles of the traffic lights, and the continuous average flow models underlying perimeter control. Timed discrete event systems (DES) models describe the delay of vehicles crossing the different links, and the queues at all the intersections of the region, and the operation of the traffic lights in each region. Model based, coordinated feedback control of the operation of the traffic lights can reduce the delay of all vehicles, as long as the overall density of vehicles remains below some threshold. These regional controllers fail to achieve acceptable performance if the density of vehicles in a region exceeds some threshold. A hierarchically higher level of perimeter control guarantees that the traffic density in the region under control remains below this threshold. This perimeter control uses the macroscopic fundamental diagram (MFD), describing the achievable average flow rate for different traffic densities. The results so far show scalable design can achieve significant improvement in the performance of urban traffic controllers.
