Programm 19. SEG Workshop
am 21. Juni 2016
im Raum 367 in der Straße der Nationen 62

Optimizing Cycle Times in Robot Based Manufacturing Lines (15:15 Uhr)

Tobias Hofmann (TU Chemnitz)

The use of industrial robots in the automotive industry noticeably changed the view of production plants and led to a tremendous increase in productivity. Nonetheless, rising technological complexity, the parallelization of production processes, as well as the crucial need for respecting safety issues pose new challenges for man and machine. Furthermore, the progress shall proceed – production cannot be too fast, too safe or too cheap.

This is the topic that me and my colleagues from TU Chemnitz tackle within the ERDF research project viRAL (Validierte Inbetriebnahme von Roboteranlagen mit automatischer Logik- und Lageprüfung) joint with Voith Engineering Services GmbH and Fraunhofer IWU in Chemnitz. Our goal is to create tools that make the commissioning process more reliable by verifying the programs of robots and logical controllers. This in particular includes optimizing the schedule of robots in order to ensure desired cycle times already in the planning phase.

The talk will be about a periodic scheduling problem as it typically appears in the context of generating train timetables as well as why and how the mathematical models used in this field are well applicable to our scheduling problem. We adapt a max-plus algebra approach to the industrial environment, yielding a max-plus eigenvalue problem.

Chromatic number of P_5-free graphs (15:45 Uhr)

Ingo Schiermeyer (Technische Universität Bergakademie Freiberg)

In this talk we study the chromatic number of P_5-free graphs. Gyárfas has shown the following.

Theorem Let G be a P_k-free graph for $k \geq 4$ with clique number $\omega(G) \geq 2$. Then $\chi(G) \leq (k-1)^{\omega(G)-1}$.

and has posed the following question:

Question Is there a polynomial (χ-bounding) function f_k for $k \geq 5$ such that every P_k-free graph G satisfies $\chi(G) \leq f_k(\omega(G))$?

We will show that there are polynomial χ-binding functions for several subclasses of P_5-free graphs.

Pause (16:15 Uhr)

Generating k-irreducible triangulations of surfaces (16:45 Uhr)

Sebastian Melzer (TU Dresden)

A triangulation of a surface other than S^2 is *k-irreducible* ($k \geq 3$) if it has edge width k and is contraction-minimal with that property. This class includes the well-studied irreducible triangulations ($k = 3$) as well as the contraction-minimal locally cyclic triangulations ($k = 4$). There already is a complete list of all 3-irreducible triangulations of the surfaces M_1, M_2, N_1, N_2, N_3 and N_4. For N_1, the 4-irreducible triangulations are known as well. We present an algorithm that generates all k-irreducible triangulations of a fixed surface by vertex-splitting, starting with its $(k-1)$ irreducible triangulations. Using a parallel implementation of this algorithm, we gained new insights into ≤ 6-irreducible triangulations of small 2-manifolds. In particular, we obtained

the complete list of all 63 5-irreducible triangu- lations of N_1, all 1196 4-irreducible triangulations of M_1 and all 2303 4-irreducible triangulations of N_2.

Counting rainbow colorings (17:15 Uhr)

Markus Dod [1], Sara Kischnick [2], and Peter Tittmann [2]

[1] IVM Institut für Vernetzte Mobilität gGmbH
[2] University of Applied Sciences Mittweida

A rainbow coloring of an undirected graph G is an edge coloring such that every pair of vertices is connected by a path for which no two edges are colored alike. The rainbow polynomial $\rho(G; x)$ counts the number of rainbow colorings of the graph G with x colors. An s-rainbow coloring is an edge coloring of G such that there exist rainbow paths from an arbitrary vertex s to all other vertices of G. We define the s-rainbow polynomial $\rho(G; s; x)$ and present some results for this polynomial.

Abendessen im Ratskeller (18:00 Uhr)