

Accepted Manuscript

A topological view on algebraic computation models

Eike Neumann, Arno Pauly

PII: S0885-064X(17)30076-6
DOI: <http://dx.doi.org/10.1016/j.jco.2017.08.003>
Reference: YJCOM 1338

To appear in: *Journal of Complexity*

Received date: 4 March 2016
Accepted date: 2 August 2017



Please cite this article as: E. Neumann, A. Pauly, A topological view on algebraic computation models, *Journal of Complexity* (2017), <http://dx.doi.org/10.1016/j.jco.2017.08.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A topological view on algebraic computation models

Eike Neumann^a, Arno Pauly^{b,c,1}

^a*Aston University, Birmingham, UK*

^b*University of Cambridge, Cambridge, UK*

^c*Birmingham University, Birmingham, UK*

Abstract

We investigate the topological aspects of some algebraic computation models, in particular the BSS-model. Our results can be seen as bounds on how different BSS-computability and computability in the sense of computable analysis can be. The framework for this is Weihrauch reducibility. As a consequence of our characterizations, we establish that the solvability complexity index is (mostly) independent of the computational model, and that there thus is common ground in the study of non-computability between the BSS and TTE setting.

Keywords: Weihrauch reducibility, BSS-machine, Analytic machine, Effective DST, solvability complexity index, TTE, Computable analysis

2010 MSC: 03D78, 68Q05, 12Y05

1. Introduction

There are two major paradigms for computability on functions on the real numbers: On the one hand, computable analysis in the tradition of GRZEGORCZYK [1, 2] and LACOMBE [3] as championed by WEIHRAUCH [4, 5] (see also the equivalent approaches by POUR-EL and RICHARDS [6] or KO [7]). On the other hand, the BSS-machines by BLUM, SHUB and SMALE [8, 9], or the very similar real-RAM model. Incidentally, both schools claim to be in the tradition of TURING.

Computable analysis can, to a large extent, be understood as effective topology [10, 11] – this becomes particularly clear when one moves beyond just the real numbers, and is interested in computability on spaces of subsets or functionals. In particular, we find that the effective Borel hierarchy occupies the position analogous to the arithmetical hierarchy in classical recursion theory; and that incomputability of natural problems is typically a consequence of dis-

Email addresses: neumaef1@aston.ac.uk (Eike Neumann), Arno.M.Pauly@gmail.com (Arno Pauly)

¹Pauly has since moved to the Université Libre de Bruxelles.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات