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Complexity Of Lattice Problems A

On the Complexity of Lattice Problems with Polynomial ...
On the Complexity of Lattice Problems with Polynomial Approximation Factors Oded Regev/May 21, 2007 Abstract Lattice problems are known to be hard to approximate to within sub-polynomial factors For larger approximation factors, such as p n, lattice problems are known to be in complexity classes such as NP\coNP and are hence unlikely to be

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The Complexity of the Covering Radius Problem on Lattices ...
these applications, attention to the covering radius problem, specifically from a computational complexity point of view, has been recently brought by Micciancio [26] who showed that this problem can be used to get tighter connections between the average and worst case complexity of lattice

problems

Mastermath, Spring 2018 Lecture 8 End of Transference ...

Complexity of lattice problems Many lattice problems are hard to calculate, or even to approximate We prove NP-hardness of CVP and the fact that CVP is at least as hard as SVP, after which we discuss hardness of approximation Theorem 6 CVP is NP-hard

Complexity of lattice problems on cyclic lattices

Complexity of lattice problems on cyclic lattices Xun Sun (Claremont Graduate University) Introduction Complexity of lattice problems Complexity on cyclic lattices Well-rounded cyclic lattices Future work Lattice Problems There is a class of algorithmic optimization problems on lattices We will consider two famous examples De nition 2

Solving All Lattice Problems in Deterministic Single ...

Complexity of Lattice problems Findingexactsolutions Best known algorithms run inexponentialtime NP-hard: no subexponential time solution is expected Finding good (nO(1)) approximations Foundation of lattice basedcryptography Notknown how to solve substantiallyfaster than exactversion Finding exponential (2O(n)) approximations

Some Complexity Results and Bit Unpredictable for Short ...

Among all the lattice problems, shortest vector problem is NP-hard under random reduction which is proved by Micciancio[24] It could be randomly reduced from a special version of CVP which is NP-hard under deterministic reduction This work could be regarded as the fundamental complexity result of lattice problems as SVP is the core problem in

CS 355 { Topics in Cryptography Lecture 9: Lattice ...

on some worst-case hardness assumption alone is also quite interesting from a complexity-theoretic perspective 9-1 Lattice Problems In order to construct crypto schemes, people do not actually use worst-case problems such as GapSVP directly Instead, people use average-case problems …

Lattice Problems in NP coNP - NYU Courant

The complexity of lattice problems in the range of polynomial approximation factors is of particular interest For example, Ajtai’s seminal work [3] is based on the hardness of approximation in this region (see also [5, 25]) A sequence of incomparable results gave upper bounds on the complexity of lattice problems

A Decade of Lattice Cryptography

problems are at least as hard to solve as certain worst-case lattice problems We also cover their more compact and efficient ring-based analogues, ring-SIS and ring-LWE Chapter 5 describes a wide variety of essential lattice-based cryptographic constructions, ranging from

A Deterministic Single Exponential Time Algorithm for ...

In this paper we resolve this question in the a rmative, giving a deterministic single exponential time algorithm for CVP, and therefore by the reductions in [23, 38], also to SVP, SIVP and several other lattice problems in NP considered in the literature This improves the time complexity of

New Shortest Lattice Vector Problems of Polynomial ...

The Shortest Lattice Vector (SLV) problem is in general hard to solve, except for special cases (such as root lattices and lattices for which an obtuse superbase is known) In this paper, we present a new class of SLV problems that can be solved efficiently Specifically, if for an

Worst-case time complexity of a lattice formation problem

are established for certain formation control problems More recently, Mart´ınez et al in [2] propose a detailed model and analyze the time complexity

of basic ren-dezvous and deployment algorithms For many of the resulting linear dynamical systems, the worst case time complexity is of order Θ(n2 logn) (rendezvous) and O(n3 logn

Complexity and fragility in the lattice percolation problem

Lattice percolation Phase transition Complexity and fragility in lattices Lattice as LP (linear program) 2D vs higher dimensions 2D lattices are special: primal and dual problems are essentially the same dual of paths are paths there is no duality gap in higher dimensions, eg, 3: dual of a path is a surface

On the Complexity of Lattice Puzzles

2012ACMSubjectClassification Theoryofcomputation→Problems,reductionsandcompleteness lattice puzzle If the puzzle has a hint of the order of each set of plates by, for example, one/twosided operations #depths rule complexity note

Hard Lattice Problems

Whereinnovation starts Hard Lattice Problems Benne de Weger (inspired by Joop van de Pol's MSc Thesis, 2011) bmmdweger@tuenl Kolkata, India, Jan 12, 2012

Daniele Micciancio UC San Diego

Outline Lattice Problems – Introduction to Lattices, SVP, SIVP, etc Cryptographic assumptions – Average-case vs worst-case complexity Example Application Issues/Discussion – Choosing security parameters – Using lattices with special properties

Algorithms for the Shortest and Closest Lattice Vector ...

Abstract We present the state of the art solvers of the Shortest and Closest Lattice Vector Problems in the Euclidean norm We recall the three main families of algorithms for these problems, namely the algo-rithm by Micciancio and Voulgaris based on the Voronoi cell [STOC'10], the Monte-Carlo algorithms derived from the Ajtai, Kumar and Sivaku-

A Deterministic Single Exponential Time Algorithm for ...

lattice based cryptographic hash functions with worst-case/average-case connection [4, 41] SVP and CVP also have many applications in communication theory, eg, lattice coding for the Gaussian channel and vector quantization [18] The complexity of lattice problems has been investigated intensively All three problems mentioned above