

One-Sided Random Context Grammars: Established Results and Open Problems

Petr Zemek

Brno University of Technology, Faculty of Information Technology
Božetěchova 2, 612 00 Brno, CZ
<http://www.fit.vutbr.cz/~izemek>





Area

- Theoretical computer science, formal language theory

Topic

- One-sided random context grammars: established results and open problems



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- One-sided random context grammars: established results and open problems

What are one-sided random context grammars?

- computationally complete formal model
- vivid topic in today's formal language theory



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- One-sided random context grammars: established results and open problems

Why summarize established results and open problems?

- give scientists a base where to start a promising research
- show what has been done and what is left



- variant of a random context grammar
- $P = P_L \cup P_R$
- $(A \rightarrow x, U, W) \in P$



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- $P = P_L \cup P_R$
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$\leftarrow \dots \boxed{A} \dots$



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Example

$(A \rightarrow x, \{B, C\}, \{D\}) \in P_L$

$bBcECbAcD$



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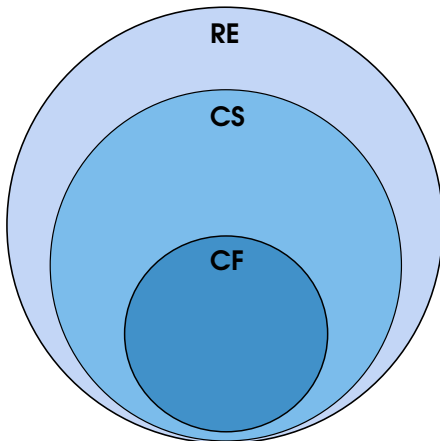
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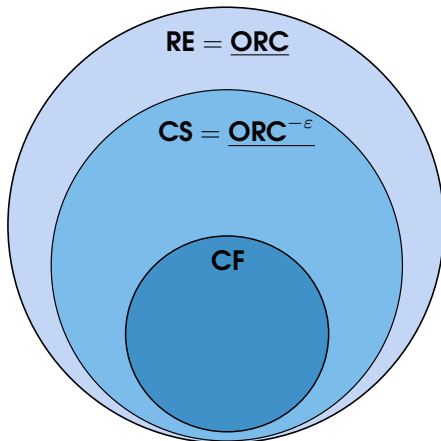
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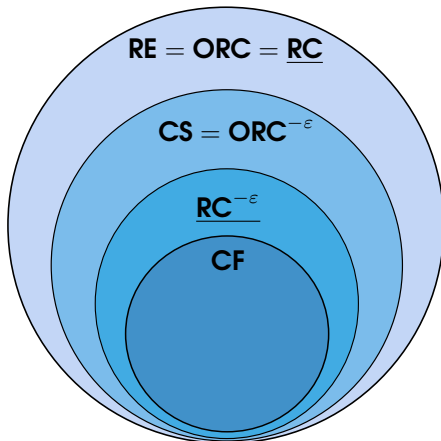
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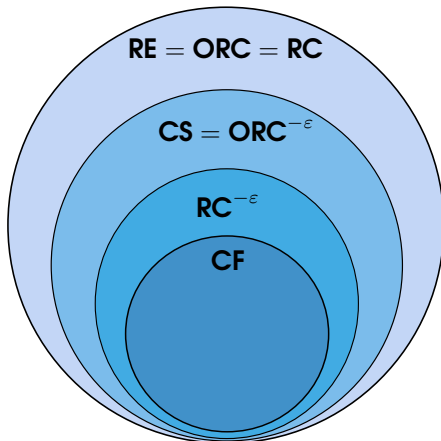
$(A \rightarrow x, \{B, C\}, \{D\}) \in P_L$

$\overleftarrow{bBcECb} \boxed{A} cD \Rightarrow bBcECb x cD$





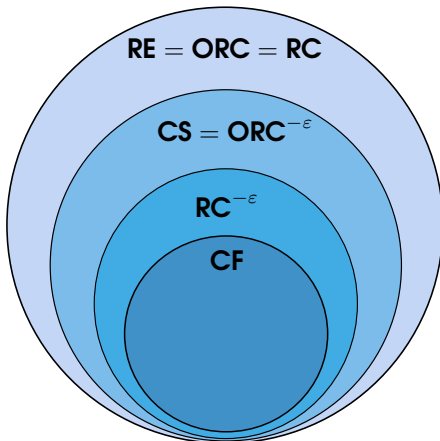




A. Meduna and P. Zemek

One-Sided Random Context Grammars

In: *Acta Informatica*, 2011



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A. Meduna and P. Zemek
*Regulated Grammars and
Their Transformations*
BUT FIT, 239 pages, 2010



- left forbidding grammars



F. Goldefus and T. Masopust and A. Meduna

Left-Forbidding Cooperating Distributed Grammar Systems

In: *Theoretical Computer Science*, 2010

- same power as context-free grammars

- left forbidding grammars



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E. Csuhaj-Varjú and T. Masopust and G. Vaszil

Cooperating Grammar Systems with Permitting Grammars as Components

In: *Romanian Journal of Information Science and Technology*, 2009

- **open problem:** generative power

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One-Sided Random Context Grammars

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- **open problem:** generative power

- reduction of nonterminals



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Nonterminal Complexity of One-Sided Random Context Grammars

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Theorem

Every one-sided random context grammar can be converted to an equivalent one having no more than 10 nonterminals.

- reduction of nonterminals



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One-Sided Random Context Grammars with a Limited Number of Right Random Context Rules

Submitted to *Theoretical Computer Science*

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Open problem: Can we improve these bounds?



- normal forms



P. Zemek

Normal Forms of One-Sided Random Context Grammars

In: *EEICT*, 2012



- normal forms



P. Zemek

Normal Forms of One-Sided Random Context Grammars

In: *EEICT, 2012*

- leftmost derivations



A. Meduna and P. Zemek

One-Sided Random Context Grammars with Leftmost Derivations

In: *LNCS Festschrift Series: Languages Alive, 2012*



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- generalized versions



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Generalized One-Sided Forbidding Grammars

In: *International Journal of Computer Mathematics, 2013*

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Normal Forms of One-Sided Random Context Grammars

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Open problem: Variants of one-sided random context grammars.

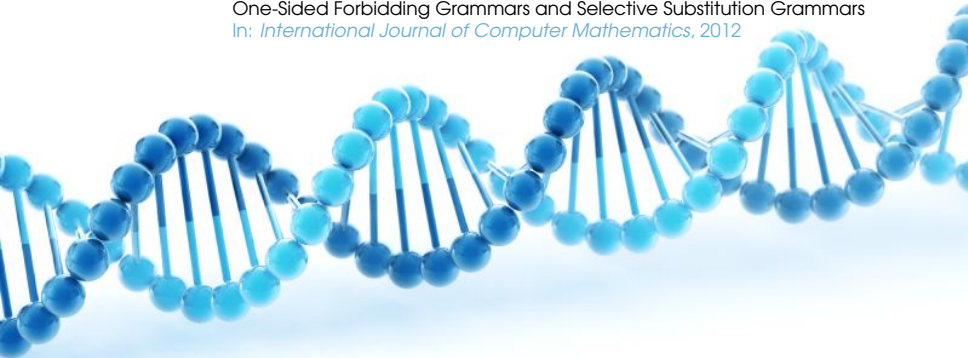


- applications
 - molecular genetics



A. Meduna and P. Zemek

One-Sided Forbidding Grammars and Selective Substitution Grammars
In: *International Journal of Computer Mathematics*, 2012



- applications
 - parsing



A. Meduna and L. Vrabel and P. Zemek

LL One-Sided Random Context Grammars

Submitted to *Schedae Informaticae*

```
public class TcpClientSample
{
    public static void Main()
    {
        byte[] data = new byte[1024]; string input, stringData;
        TcpClient server;
        try{
            server = new TcpClient(" . . . . ", port);
        }catch (SocketException){
            Console.WriteLine("Unable to connect to server");
            return;
        }
        NetworkStream ns = server.GetStream();
        int recv = ns.Read(data, 0, data.Length);
        stringData = Encoding.ASCII.GetString(data, 0, recv);
        Console.WriteLine(stringData);
        while (true) {
            input = Console.ReadLine();
            if (input == "exit") break;
            newchild.Properties["ou"].Add(
                "Auditing Department");
            newchild.CommitChanges();
            newchild.Close();
        }
    }
}
```

- other models equipped with one-sided random context



A. Meduna and P. Zemek

Left Random Context ETOL Grammars

In: *Fundamenta Informaticae*, 2013

