For more information, please check out the full cv: click here

Júlia Kossmann, Professional Problem Solver

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Nationality	Brazilian & Italian

PROFESSIONAL EXPERIENCE

Reverse Engineering & Security Project (Freelance Job)

Brazil/Remote
December 2021–Feb.2022

- Integrated a team of 3 in a complex project, proposed by a British businessman, dedicated to extract and modify the source code of a closed software.
- Managed to advance the project by decrypting and extracting resources from the binary code.
- Developed an application that was able to automate the process of modifying the files and resources with efficiency.

One-time pad (OTP) Encryption project

- Used Claude Shannon's definition of Secrecy to measure the security of a cipher to disable hackers from, hence, decipher the plaintext.
- Applied $[\forall p, c : P[E(k,p) = c] = \frac{\#of\ keys\ in\ \mathcal{K}\ s.t.\ E(k,p)=c}{|\mathcal{K}|}]$ to match the probability of two plaintext being encrypted, implying that there can be *no* discernible patterns in the encryption process, making difficult hacker's process of decrypting.

Image Compression using Fast Fourier Transform (FFT) project

- Used the FFT2 built into NumPy (Python lib) averaging the colours channels to work on a grayscale array to reach better performance+simplicity.
- Applied the FFT algorithm, managing to reduce the complexity of computing the DiscreteFT (def. $X_k = \sum_{n=0}^{N-1} x_n e^{-i2\pi kn/N}\ \ k = 0, \dots, N-1$) from $O(N^2)$ to $O(NlogN)$, N being the data size.
- Such that, achieved a high efficiency by keeping the largest 10% of Fourier coeff. turning into a vector and sorting all values, thresholding the image and obtaining a perfect compressed one.

Malware Analysis Project

- Runned REMnux as a docker image, executed $1 \leq n \leq 10, s.t.\ n \in \mathbb{N} \setminus \{0\}$, static analysis in a traditional pdf-based file corrupted by a malware, aiming at vulnerabilities.
- Found the document was opening the powershell and passing encoded texts.
- Analysed encoded text by decrypting it and checking for suspicious infos, hence, came up with a mitigation against the malicious software.

SOFT SKILLS

- Autodidact
- Ambitious
- Fast Learner
- Stress Resistant
- Good Teamwork
- Leadership Skills

COMPUTING EXPERIENCE

Programming: C/C++, Python, Julia, SQL.
Tools: SAGE, OpenCV, Jupyter Notebook, LINUX, Gnuplot, Pandas, Numpy, Scikit-learn, LaTeX, various mathematical packages.Usage of interval arithmetic and validated numerics.
Additional basic knowledge: HTML, CSS, JavaScript, R, MATLAB.

Main Operating System: BlackArch Security.

EDUCATION

Independent University of Moscow, IUM
2022 — Master of Science in Mathematics
Invited to join a special program after achieving medals in Mathematical Olympiads.
Key courses for cybersec/cryptography: Number theory, Algebra and Combinatorics.

Federal University of Minas Gerais, UFMG
2022 — Bachelor of Science in Computational Mathematics
Emphasis in Computer Science and in Mathematics

Federal University of Santa Catarina, UFSC
2021 —2022 Bachelor of Science in Computer Engineering
Interrupted.

RESEARCH SUBJECTS

Analytic number theory, asymptotic group theory, position-based quantum cryptography/applied number theory, formal logic and semantics of programming languages, homotopy type theory, Kolmogorov complexity, relative computability and the turing degrees, probabilistic number theory.

CONTACT ME:

HOBBIES

Hobbyist Competitive Programmer

- Won a university's competition in which a deadline of 30 days was given, achieving the success of solving all the programming problems in a few hours.
- Self-studied competitive programming and a lot of algorithms in C++ programming language, getting solo into the semi-finals of the ICPC female league (a big team programming competition).
- Improved constantly the abilities in solving complex programming problems for companies' better efficiency.

LANGUAGES

- Portuguese C2
- English C1
- Russian C1
- French B1
- Finnish B1
- Spanish B1
- Turun murre A2
- Ukrainian A2
- Chinese A2
- German A2
- Italian A1

COURSES

- Cryptography I, **Stanford** University
- Master's Course in Fundamentals and Trends in Vision and Image Processing: The Two Sides of Neural Networks, National Institute for Pure and Applied Mathematics, **IMPA**
- Introduction to Quantum Computing, National Institute for Pure and Applied Mathematics, **IMPA**
- High Performance Computing and Fundamentals of Quantum Computing, National Laboratory of Scientific Computing, **LNCC**
- Mathematical and Computational Modelling, National Laboratory of Scientific Computing, **LNCC**
- Combinatorics and Algorithms Design, **Tsinghua** University