Blockchain Data Analytics

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Abstract—Over the last couple of years, Bitcoin cryptocurrency and the Blockchain technology that forms the basis of Bitcoin have witnessed an unprecedented attention. Designed to facilitate a secure distributed platform without central regulation, Blockchain is heralded as a novel paradigm that will be as powerful as Big Data, Cloud Computing, and Machine Learning.

The Blockchain technology garners an ever increasing interest of researchers in various domains that benefit from scalable co-operation among trust-less parties. As Blockchain data analytics further proliferates, a need to glean successful approaches and to disseminate them among a diverse body of data scientists became a critical task. As an inter-disciplinary team of researchers, our aim is to fill this vital role.

In this tutorial, we offer a holistic view on Blockchain Data Analytics. Starting with the core components of Blockchain, we will discuss the state of art in Blockchain data analytics for graph, security, finance, and management domains. We will share tutorial notes and further reading pointers on the tutorial website blockchaintutorial.github.io.

I. TUTORIAL OUTLINE

Overall, the tutorial consists of the following five parts. **Core Blockchain Technology** will describe how the Blockchain technology was created [1], how ideas were adopted from various research fields and how they were put to use in creating a distributed and secure ledger. **Graph Analytics on Blockchain** will provide a comprehensive discussion of the benefits and limitations of adopting and using traditional graph mining approaches for Blockchain. **Financial Analytics on Blockchain** will be an entry point for researchers that are interested in tailoring data mining techniques for financial and management science aspects of the Blockchain data. **Blockchain Data Analytics for Security and Privacy** will discuss how Blockchain data analytics could be conducted to attack individual privacy and discuss using Blockchain analytics techniques for detecting malicious uses of the cryptocurrencies. **Blockchain in Society** will provide a selection of Blockchain data analytics use cases and discuss their future impacts on society. This section will provide an entry point for researchers that focus on the use cases of Blockchain data mining and its broader societal impact.

TUTORS

Cuneyt Gurcan Akcora is a Postdoctoral Fellow in the Departments of Statistics and Computer Science at the University of Texas at Dallas. He received his Ph.D. from University of Insubria, Italy and his M.S. from SUNY Buffalo, USA. His research interests are Data Science on complex networks and large scale graph analysis, with applications in social, biological, IoT and Blockchain networks. He is a Fulbright Scholarship recipient, and his research works have been published in leading conferences and journals including VLDB, ICDM and ICDE.

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Murat Kantarcioglu is a Professor in the Computer Science Department and Director of the UTD Data Security and Privacy Lab at the University of Texas at Dallas and a visiting scholar at Harvard University Data Privacy Lab. He is a recipient of NSF CAREER award, and Purdue CE-RIAS Diamond Award for Academic excellence. His research focuses on creating technologies that can efficiently extract useful information from any data without sacrificing privacy or security. His research has been supported by grants from NSF, AFOSR, ONR, NSA, and NIH. He has published over 160 peer reviewed papers related to data security, privacy and privacy-preserving data mining. His research work has been covered by the media outlets, such as Boston Globe, ABC News, and has received three best paper awards.

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REFERENCES

[1] S. Nakamoto. *Bitcoin: A peer-to-peer electronic cash system*. 2008.

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