

First is the improvement of the automatic selection of extraction parameters (described in Section 3.2) so that more traces can be analyzed with lower extraction errors automatically. Second, we think that the approaches to automatic model extraction should be compared with the manual-built models crafted by humans. In such evaluation the human caused errors could be compared with the imperfections of the MSD extraction algorithm. Such evaluations are challenging and time consuming (mainly due to the involvement of the human factor), however the results would be interesting. Finally, the proposed approach was tailored (but not limited) to extract traffic models in a DNI-friendly format. The scope could be extended and also the extraction of other traffic models could be added.

7. REFERENCES

- [1] A. Adas. Traffic Models in Broadband Networks. *Communications Magazine, IEEE*, 35(7):82–89, Jul 1997.
- [2] D. Aschenbrenner, F. Sittner, M. Fritscher, M. Krauss, and K. Schilling. Teleoperation of an Industrial Robot in an Active Production Line. In *Proceedings of 2nd IFAC Conference on Embedded Systems, Computational Intelligence and Telematics in Control (CESCIT)*, 2015.
- [3] P. Bloomfield. *Fourier Analysis of Time Series: An Introduction*. Wiley, 1976.
- [4] S. Chowdhury and A. Akram. E-Maintenance: Opportunities and Challenges. In *Proceedings of the 34th Information Systems Research Seminar in Scandinavia (IRIS)*, pages 68–81, 2011.
- [5] V. Frost and B. Melamed. Traffic Modeling for Telecommunications Networks. *Communications Magazine, IEEE*, 32(3):70–81, March 1994.
- [6] A. Grzech and P. Świątek. Parallel Processing of Connection Streams in Nodes of Packet-switched Computer Communication Systems. *Cybernetics and Systems*, 39(2):155–170, 2008.
- [7] S. Kandula, S. Sengupta, A. Greenberg, P. Patel, and R. Chaiken. The nature of data center traffic: Measurements & analysis. In *Proceedings of the 9th ACM SIGCOMM Conference on Internet Measurement Conference, IMC '09*, pages 202–208, New York, NY, USA, 2009. ACM.
- [8] S. Kounev. Performance Modeling and Evaluation of Distributed Component-Based Systems using Queueing Petri Nets. *IEEE Transactions on Software Engineering*, 32(7):486–502, July 2006.
- [9] L. Qian, A. Krishnamurthy, Y. Wang, Y. Tang, P. Dauchy, and A. Conte. A new traffic model and statistical admission control algorithm for providing qos guarantees to on-line traffic. In *Global Telecommunications Conference, 2004. GLOBECOM '04. IEEE*, volume 3, pages 1401–1405 Vol.3, Nov 2004.
- [10] P. Rygielski and S. Kounev. Descartes Network Infrastructures (DNI) Manual: Meta-models, Transformations, Examples. Technical Report v.0.3, Chair of Software Engineering, University of Würzburg, Sep. 2014.
- [11] P. Rygielski, S. Kounev, and P. Tran-Gia. Flexible Performance Prediction of Data Center Networks using Automatically Generated Simulation Models. In *Proceedings of the Eighth EAI International Conference on Simulation Tools and Techniques (SIMUTools 2015)*, August 2015.
- [12] P. Rygielski, S. Kounev, and S. Zschaler. Model-Based Throughput Prediction in Data Center Networks. In *Proceedings of the 2nd IEEE International Workshop on Measurements and Networking (M&N 2013)*, pages 167–172, October 2013.
- [13] M. Z. Shafiq, L. Ji, A. X. Liu, and J. Wang. Characterizing and Modeling Internet Traffic Dynamics of Cellular Devices. *SIGMETRICS Perform. Eval. Rev.*, 39(1):265–276, 2011.
- [14] S. Spinner, S. Kounev, and P. Meier. Stochastic Modeling and Analysis using QPME: Queueing Petri Net Modeling Environment v2.0. In S. Haddad and L. Pomello, editors, *Proceedings of the 33rd International Conference on Application and Theory of Petri Nets and Concurrency (Petri Nets 2012)*, volume 7347 of *Lecture Notes in Computer Science (LNCS)*, pages 388–397, June 2012. Springer.
- [15] D. Steinberg, F. Budinsky, M. Paternostro, and E. Merks. *EMF: Eclipse Modeling Framework 2.0*. Addison-Wesley Professional, 2nd edition, 2009.
- [16] M. Stéphane, editor. *A Wavelet Tour of Signal Processing (Third Edition)*. Academic Press, Boston, 2009.
- [17] C. Torrence and G. P. Compo. A practical guide to wavelet analysis. *Bulletin of the American Meteorological Society*, 79:61–78, 1998.
- [18] K. V. Vishwanath and A. Vahdat. Realistic and responsive network traffic generation. In *Proceedings of the 2006 Conference on Applications, Technologies, Architectures, and Protocols for Computer Communications, SIGCOMM '06*, pages 111–122, New York, NY, USA, 2006. ACM.
- [19] J. von Kistowski, N. R. Herbst, D. Zoller, S. Kounev, and A. Hotho. Modeling and Extracting Load Intensity Profiles. In *Proceedings of the 10th International Symposium on Software Engineering for Adaptive and Self-Managing Systems (SEAMS 2015)*, May 2015.
- [20] F. Willnecker, M. Dlugi, A. Brunnert, S. Spinner, S. Kounev, and H. Krcmar. Comparing the Accuracy of Resource Demand Measurement and Estimation Techniques. In *Computer Performance Engineering — Proceedings of the 12th European Workshop (EPEW 2015)*, volume 9272 of *Lecture Notes in Computer Science*, pages 115–129. Springer, 2015.