

# PAPER REVIEW

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4th April 2018

## 1 Paper summarized

F. Ahmed, J. Erman, Z. Ge, A. X. Liu, J. Wang and H. Yan, "Detecting and Localizing End-to-End Performance Degradation for Cellular Data Services Based on TCP Loss Ratio and Round Trip Time," in IEEE/ACM Transactions on Networking, vol. 25, no. 6, pp. 3709-3722, Dec. 2017. doi: 10.1109/TNET.2017.2761758.

## 2 Summary

The main theme of the paper is the detection and localization of the E2E performance degradation. The paper basically proposes an approach to detect and localize degradation at cellular service providers taking into account four different dimensions user location(mean the Radio network controller(RNC)), content providers(youtube,google etc), device types(such as Motorola,Samsung etc.) and application types(gmail etc).The approach mentioned in the paper consists of 3 steps: Modelling, Detection and localization. The modelling approach consists of requiring to build models using training data where in flow will correspond to the particular user location, device type and application type.Each E2E has 24\*7 models where each model corresponds to a specific hour of a day and a specific day of a week.In the E2E instances group there are subgroups thus recursively the association rule mining approach is applied within groups and subgroups and further fine grain models are built for each group/subgroup. The E2E performance anomalies are detected and localized according to these models.Then subsequently the models are used to detect the performance degradation based on hourly basis.If the testing phase is worse than the expected performance it is termed as degrading. Based on the knowledge about whether a particular E2E instance is degrading or non-degrading then association rule mining is used to localize the degradation.Lastly to prove the effectiveness of the approach they use synthetic performance degradation and real network traces.

## 3 Assessment

The paper provides a well structured solution to a defined problem.The paper along with the approach also clearly identifies the challenges and propose suitable ways to tackle them. The illustrations are well supported with graphical results which gives the reader a clear idea about the research and also different steps taken to achieve a particular solution.

## 4 Potential improvement(s)

- 1) Association rule mining is used extensively in the given paper and forms an integral part of it. So it could have been better if some background information about it was given so as to give the readers a better idea about it.
- 2) The authors at one stage in the Monitoring of the E2E performance dynamics and data analysis claim that the performance difference also manifest in the 4G network after doing the real data analysis on 3G network. They use a publicly available data set to verify their claim and were successful with that but if it would have been real time data then the claim could have been more strongly put forward. The authors also have not mentioned why they did not test it on 4G network and they have not explicitly stated about the data set time frame when and where it was taken.
- 3) Most of the experiments, Training data, data sets collected which led to the following conclusions about the improving the E2E performance were performed considering North America region or taken from the network providers of that region, probably verifying the same with other regions like Asia, Europe etc could have been a good choice and would add to the credibility of the results and make them more consolidate and firm because there could be some different problems and difficulties in different regions considering the 4 major parameters which could have led to some more interesting conclusions and probably could have led to broaden the scope of the research work.
- 4) The material though is well structured but few things are repeated quite often( like the background information, modelling techniques similar things explained twice) which not only increases the length of the paper but also leads to sometimes diverting the interest and understanding of the reader this could have been taken care of.
- 5) The last section of evaluation forms an important part of the paper and proper description of that should be provided in the proposed approach or Introduction.