Development of an Agent based Alternative Path Selection Method for Peer-to-Peer Video Streaming Applications

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TÜBİTAK

Abstract

One of the most challenging parts of video streaming systems running on a peer to peer network is to cope with dynamic network conditions and unpredictable node behaviors. Therefore, in an overlay network, different paths are created from source to destination and when packet transmission problems occur in one video streaming path, destination node continues receiving packets on the other path. However, it needs to be determined whether designed path diversity or selected streaming path(s) is optimal in terms of video quality and path bandwidth. A system, based on the software agents with autonomous, reactive, proactive and social features, may be suitable for solving the selection problem of alternative paths in peer to peer video streaming systems. Hence, in this project, a new path selection system based on agents was developed in order to increase service quality of nodes in a peer to peer video streaming system. Both the construction of an overlay network and the development of the internal architecture of agents were realized. Connection between the nodes in the streaming network and the software agents were set up in order to provide agent-based selection of alternative paths. Logical path selection method, developed in this project, enables nodes to infer on the capacity and robustness of the other nodes based on the reinforcement learning. Another approach brought by the project considers the assessment of the physical paths between a node and its parents. According to the simulation results, it can be said that the proposed method performs much better than the existing methods considering all criteria on both quality of experience and network conditions.

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Related Publications:

1. Yildirim, S., Sayit, M. and Kardas, G. (2015) "*A belief-desire-intention agent architecture for partner selection in peer-to-peer live video streaming applications*", Expert Systems, vol. 32, no. 3, pp. 327-343, DOI: 10.1111/exsy.12086.

2. Teket, K. D., Sayit, M. and Kardas, G. (2014) "*Software agents for peer-to-peer video streaming*", IET Software, vol. 8, no. 4, pp. 184-192, DOI: 10.1049/iet-sen.2013.0181.

3. Teket, K. D. (2013) "*Agent-based Parent Selection in Peer-to-Peer Mesh-based Video Streaming Systems*", M.Sc. Thesis, Ege University, 60 pages (in Turkish).

4. Yildirim, S. (2012) "*An Agent Architecture for Peer-to-Peer Live Video Streaming Applications*", M.Sc. Thesis, Ege University, 82 pages (in Turkish).

5. Sayit, M., Karayer, E., Teket, K. D., Kaymak, Y., Cetinkaya, C., Demirci, S. and Kardas, G. (2013) "*A Score-based Packet Retransmission Approach for Push-Pull P2P Streaming Systems*", In proceedings of the 6th International Symposium on Multimedia Applications and Processing (MMAP 2013), held in conjunction with 2013 Federated Conference on Computer Science and Information Systems (FedCSIS 2013), September 8-11, 2013, Krakow, Poland, IEEE Conference Publications, pp. 627-633.

6. Teket, K. D., Kaymak, Y., Sayit, M. and Kardas, G. (2013) "*Engineering a Multi-agent System for Peer-to-Peer Video Streaming*", In proceedings of 2013 IEEE International Symposium on Innovations in Intelligent Systems and Applications (INISTA 2013), June 19-21, 2013, Albena, Bulgaria, IEEE Computer Society, pp. 1-7, DOI: 10.1109/INISTA.2013.6577655.

7. Sayit, M., Kaymak, Y., Teket, K. D., Cetinkaya, C., Demirci, S. and Kardas, G. (2013) "*Parent Selection via Reinforcement Learning in Mesh-based P2P Video Streaming*", In proceedings of the 10th International Conference on Information Technology: New Generations (ITNG 2013), April 15-17, 2013, Las Vegas, Nevada, USA, IEEE Conference Publications, pp. 546-551, DOI: 10.1109/ITNG.2013.89.