

Multiplexing Gains Through Clustering In Cloud Radio Access Network

There is an increase in the energy consumption and cost of base station deployment due to increase in the number of devices which require a dense deployment of base stations to handle the resultant data traffic. C-RAN (Cloud Radio Access Network) was proposed to remedy the problem of increasing data traffic volume and reduce the capital expenditure and operating expenditure of Mobile Network operators. Cloud Radio Access Network (C-RAN) allows for network resources to be shared amongst several base stations thereby reducing cost. By using different clustering algorithms such as K-means, Hierarchical and Gaussian Mixture Models to cluster these base stations there is a reduction in the needed network resources and this reduces cost. Capacity Utility and cost of deployment are the metrics used in making a comparative analysis of the different clustering algorithms used in this work. From evaluation of the methodology, it showed that the Hierarchical clustering algorithm had a Capacity Utility of 0.0012, Gaussian Mixture Models had 0.0035 and K-means with 0.0044 and when you compare this with the Capacity Utility before clustering of 0.63 it can be seen that the Hierarchical clustering algorithm had reduced the needed network resources better than Gaussian Mixture Models and K-means. The 3 clustering algorithms were also able to reduce the number of needed base stations from 182 to 80, thereby reducing Cost of deployment.

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