A quantitative approach to Consistency Theorem in clustering

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Introduction

Various Clustering Algorithms are usually studied independently, however, in 2003, Kleinberg[1] published an influential paper to build system for studying clustering algorithm as a whole. In that paper, he proposed three properties for clustering: **Scale-invariance**, **Richness** and **Consistency**, and prove that no clustering algorithm can satisfy three of them at the same time. In this project, we continue to study this general system for clustering, we start by reviewing the work of Kleinberg's work, then focus our study on the consistency property. This paper mainly has four contributions:

- Provide the proofs for three of the theorems in Kleinberg's Paper
- Describe the potential problem with consistency property
- Use simulation to show that Clustering Algorithm without Consistency property has "Partial Consistency" under Γ – transformation.
- Use Support Vector Machine and other Learning Algorithm to show the use case of Partial Consistency

Clustering Algorithm

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Γ-transformation and Consistency

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Partial Consistency

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Simulation of Γ-transformation

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Conclusion

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References

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