Thesis Plan Checklist

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1 Chapter 1: Introduction

2 Chapter 2: General Literature Review

3 Chapter 3: Spectral Clustering for Data Streams

3.1 Introduction

– Write Introduction ☐

3.2 Literature Review

– History of Spectral Clustering ☑

– Introduce speed up methods ☑

– Type up notes on existing Incremental Spectral Clustering methods ☑

3.3 Introduction to Spectral Clustering and KASP

– Basic introduction to spectral clustering, affinity matrix, choice of Laplacian. ☑

– State the NJW Spectral Clustering Algorithm ☑

– Introduce KASP ☑

3.4 Clustering data streams

– Introduce the challenges of clustering datastreams ☑

– State Clustream framework including the Cluster Feature vectors, the absorb, delete merge policy. ☑

– Write Clustream algorithmically ☑

– Using Spectral Clustering as a macroclustering algorithm ☐

– Discuss comparing Clustream spec with Ning ☐

– Maybe(Weighting the number of elements in each micro-cluster into the spectral clustering phase.) ☐

3.5 Experimentation

3.5.1 Data sets

– Simulated Multivariate Gaussian Mixture Model ☑

– Simulated Multivariate Non-Gaussian Mixture Models (t) ☑

– Real texture data set ☐

– Real UCI pendigits data (pairwise) ☑

3.5.2 Experiments to Run

– Unweighted Clustream Spectral vs Windowed Spectral ☐

– Clustream Spectral vs Clustream K-means ☑

– Clustream Spectral vs Ning Spectral ☐

– Asses recovery from jump data ☐

– Create table of table of V-measure and purity averaged over the batches and runs, for each method and data set. ☐

– Plot V-measure and purity over time for any interesting results. ☐

– Extension - choosing nMicro ☐

– Extension - Weighting centres by size of micro cluster ☐

3.6 Conclusion

– Write Conclusion ☐

4 Chapter 4: A statistical framework for Clustream

4.1 Introduction

4.2 Lit Review

4.3 Using EM to cluster data streams

– Introduce k-means ☑

– Introduce EM for GMM ☑

– Theoretically link EM-GMM and k-means ☑

– Recap Clustream? ☐

– Introduce Online EM for GMM ☑

– Theoretically link online EM-GMM with Clustream ☐

4.4 Experimentation

– Highlight similarities and differences in behaviour ☐

– Clustream Spectral vs Online GMM Spectral ☐

– Density plots would be useful here ☐

4.5 Conclusion

5 Chapter 5: Compressive Sensing for Background Subtraction

– Insert conference paper ☑

– Do I need any more material? ☐

6 Chapter 6: Conclusions

– Write Conclusion ☐