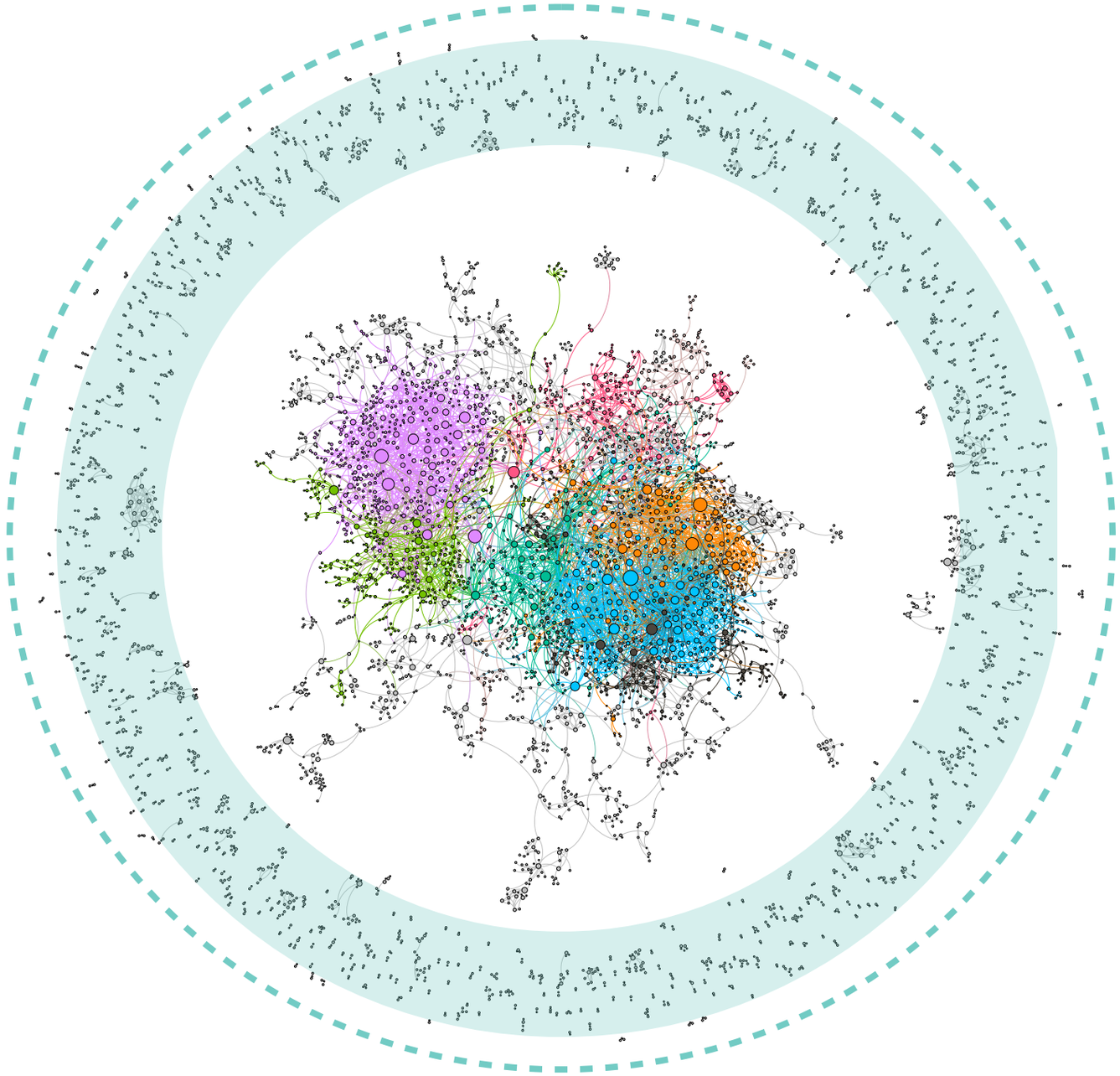

Temporal Alignment of Reddit Network Embeddings

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&

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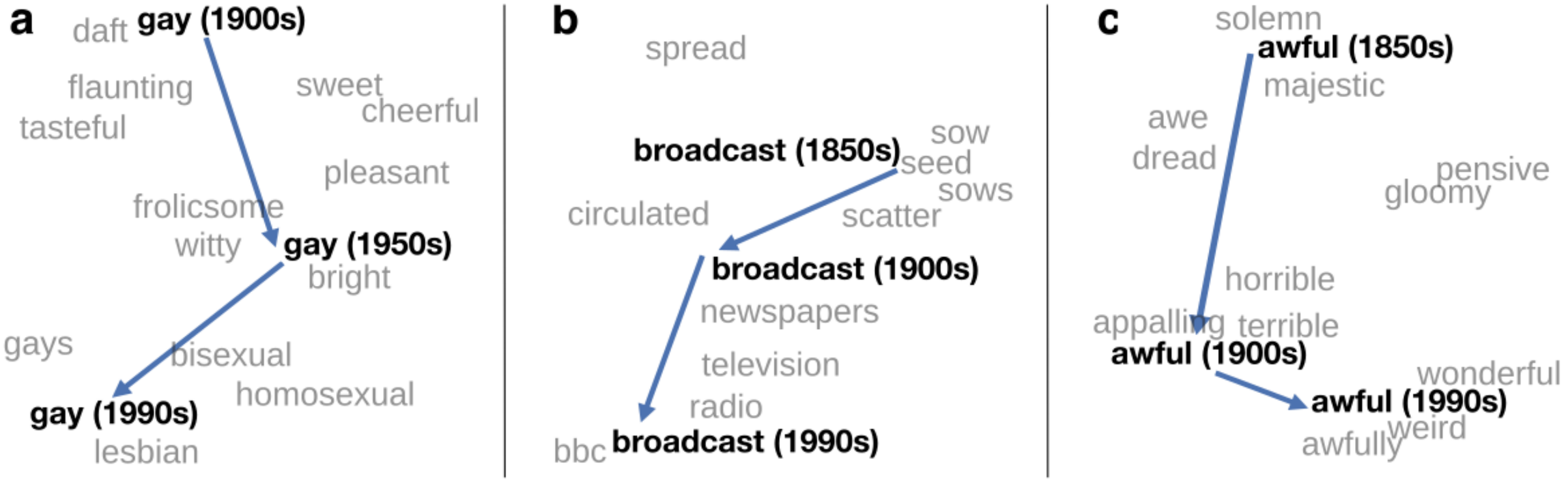
1 Motivation

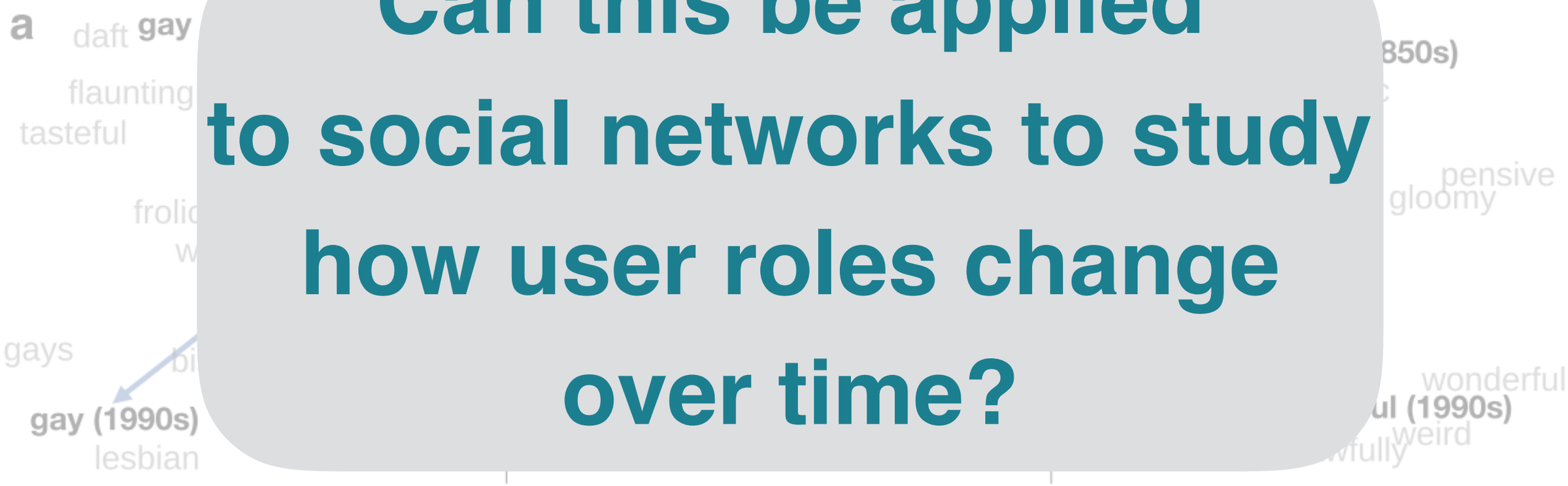
Diachronic Word Embeddings from the field of Natural Language Processing (NLP)



Hamilton, W. L., et al. ACL (2016)

1 Motivation

Diachronic Word Embeddings from the field of Natural Language Processing (NLP)



Can this be applied to social networks to study how user roles change over time?

Hamilton, W. L., et al. ACL (2016)

2 Methodology

Dataset consists of 29 subreddits identified by Hamilton et al. as exhibiting the most “loyal” or “vagrant” user features

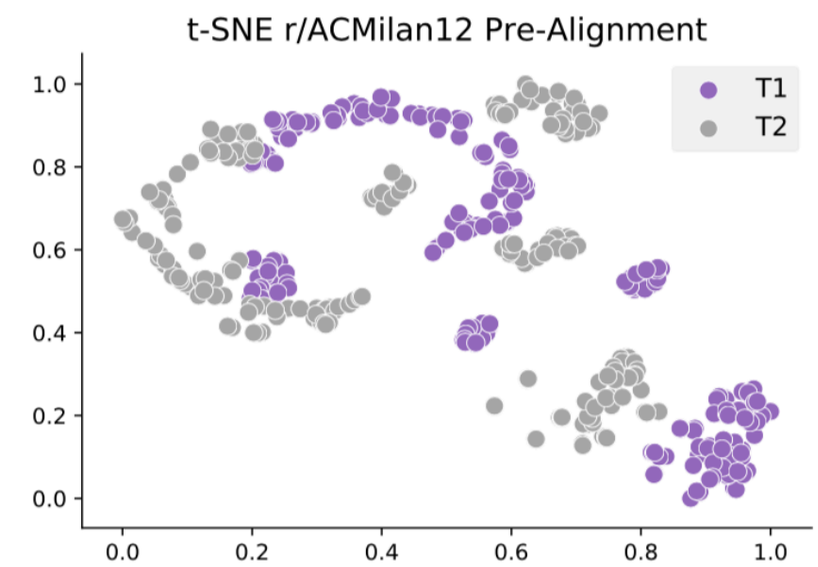
Class	#SR	#V_{T1}	#E_{T1}	#V_{T2}	#E_{T2}	#V_{T3}	#E_{T3}
Loyal	13	15,319	89,496	15,193	91,138	14,531	87,149
Vagrant	16	13,462	22,323	14,030	23,831	13,314	22,247

Table: Notation - SR: Subreddits, VT 1: Nodes in Temporal Window 1, ET 1: Edges in temporal window 1

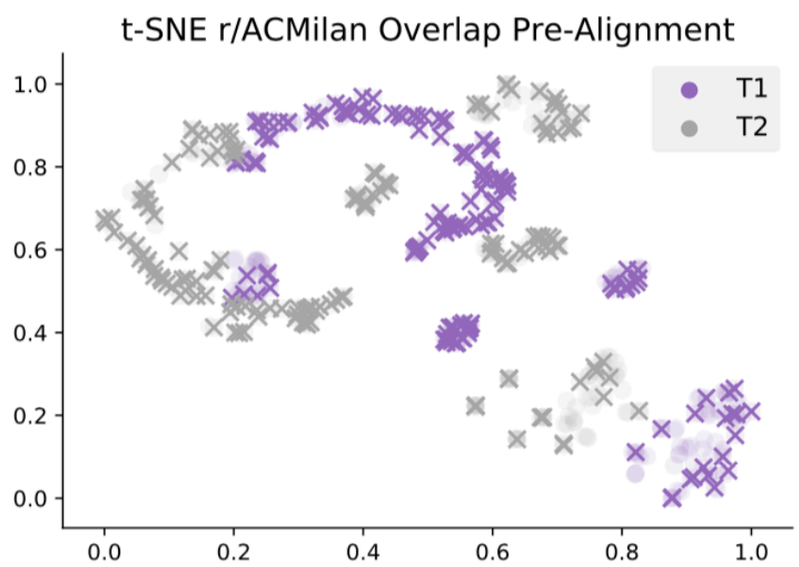
- **Loyal** - Teams and sports related subreddits
- **Vagrant** - Picture submission subreddits such as “r/earthporn” or “r/foodporn”.

2 Methodology

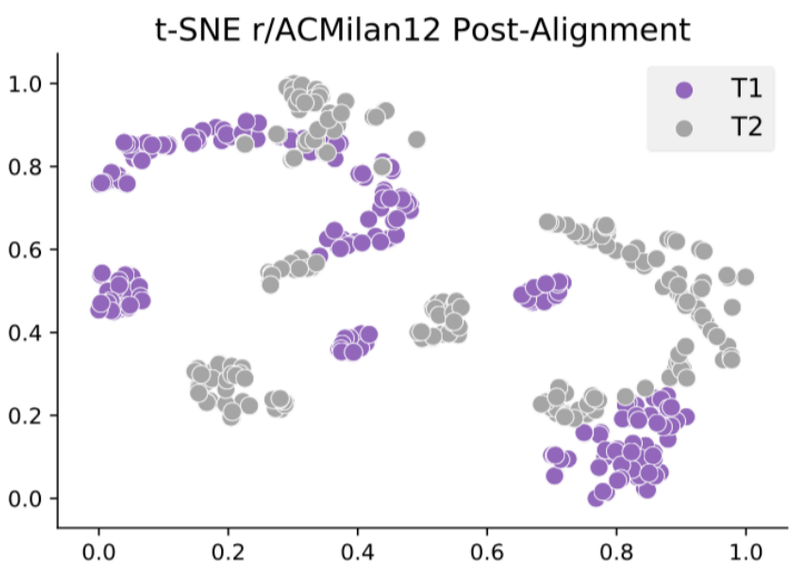
Temporal Role Alignment



(a) Pre-Alignment Embeddings



(b) User Overlap Embeddings



(c) Post-Alignment Embeddings

- Graph embeddings are generated using ***struc2vec*** (Ribeiro et al, KDD'17)
- Spaces are aligned using **normalised orthogonal Procrustes**

2 Methodology

Evaluation - Cosine Similarity

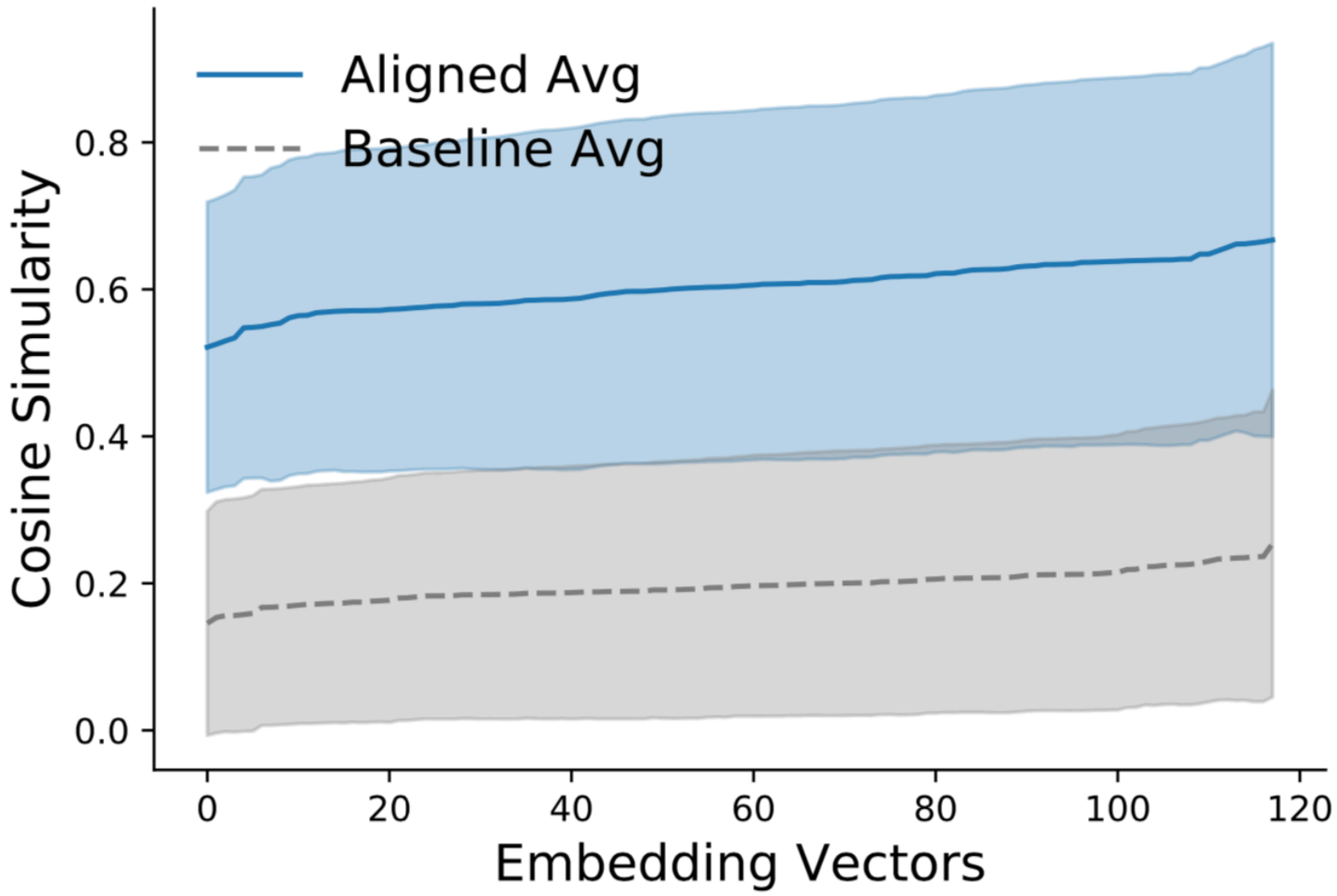
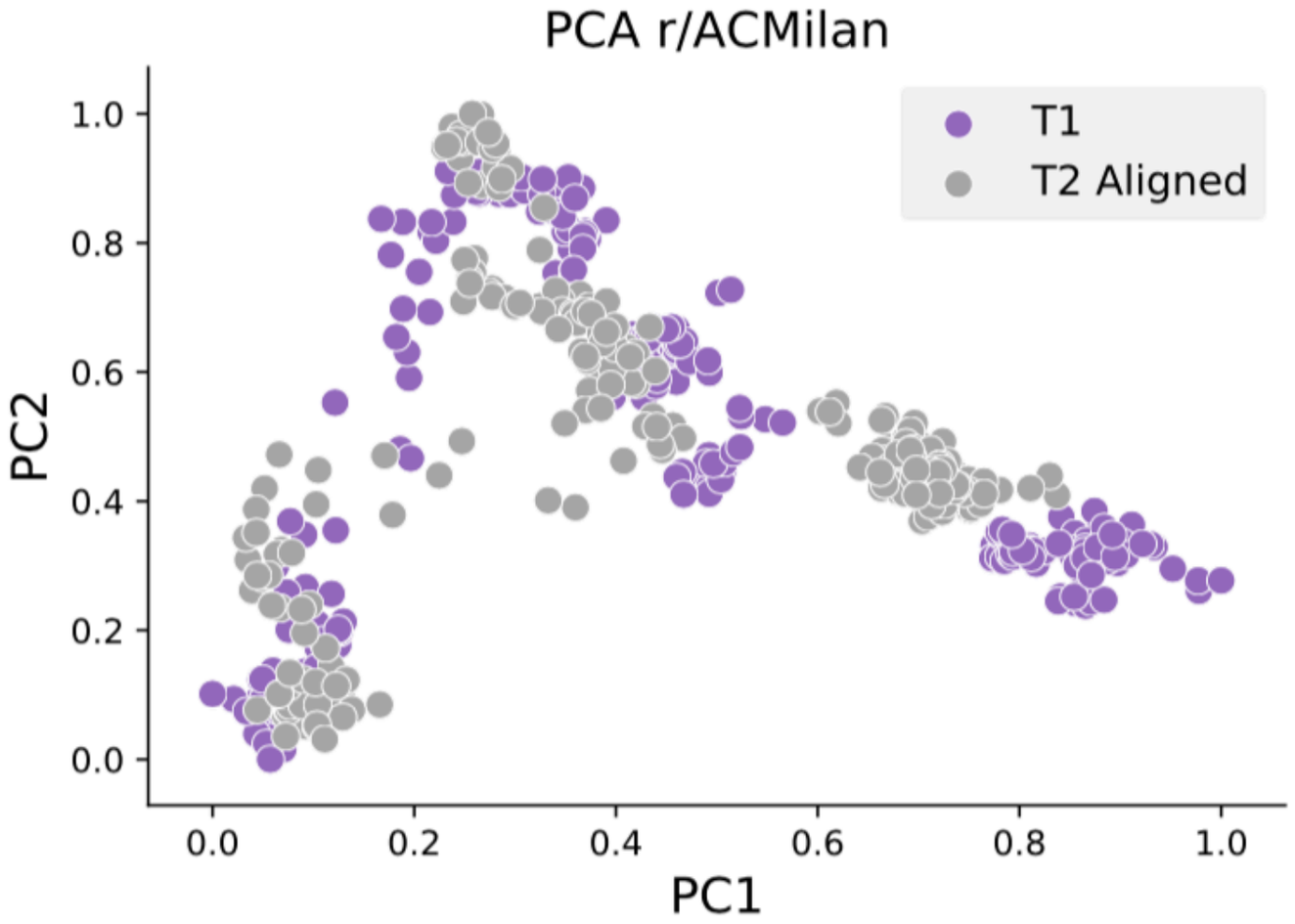


Figure 3: Cosine Similarity results for alignment evaluation.

2 Methodology

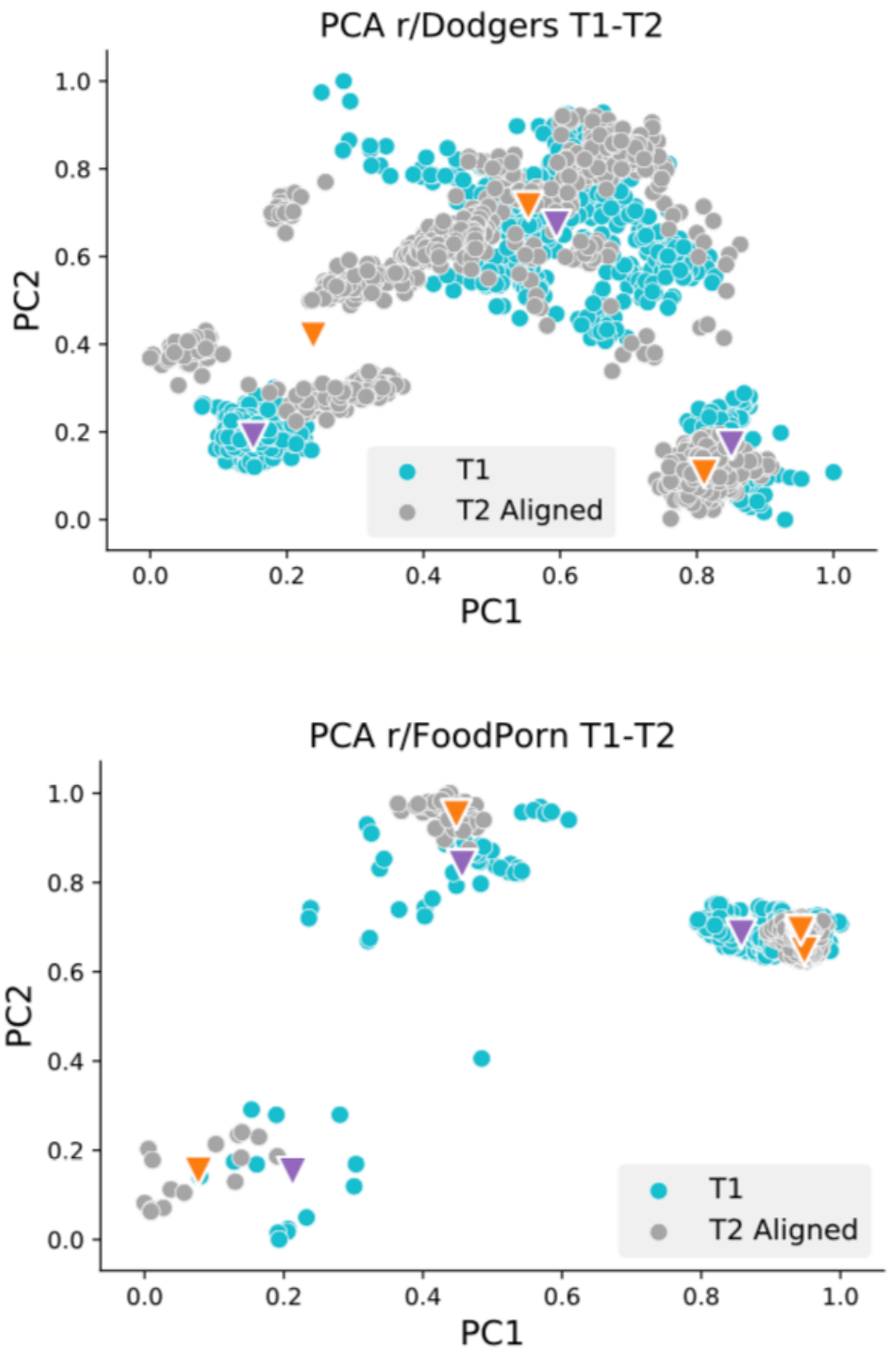
Temporal Role Alignment - Community Roles

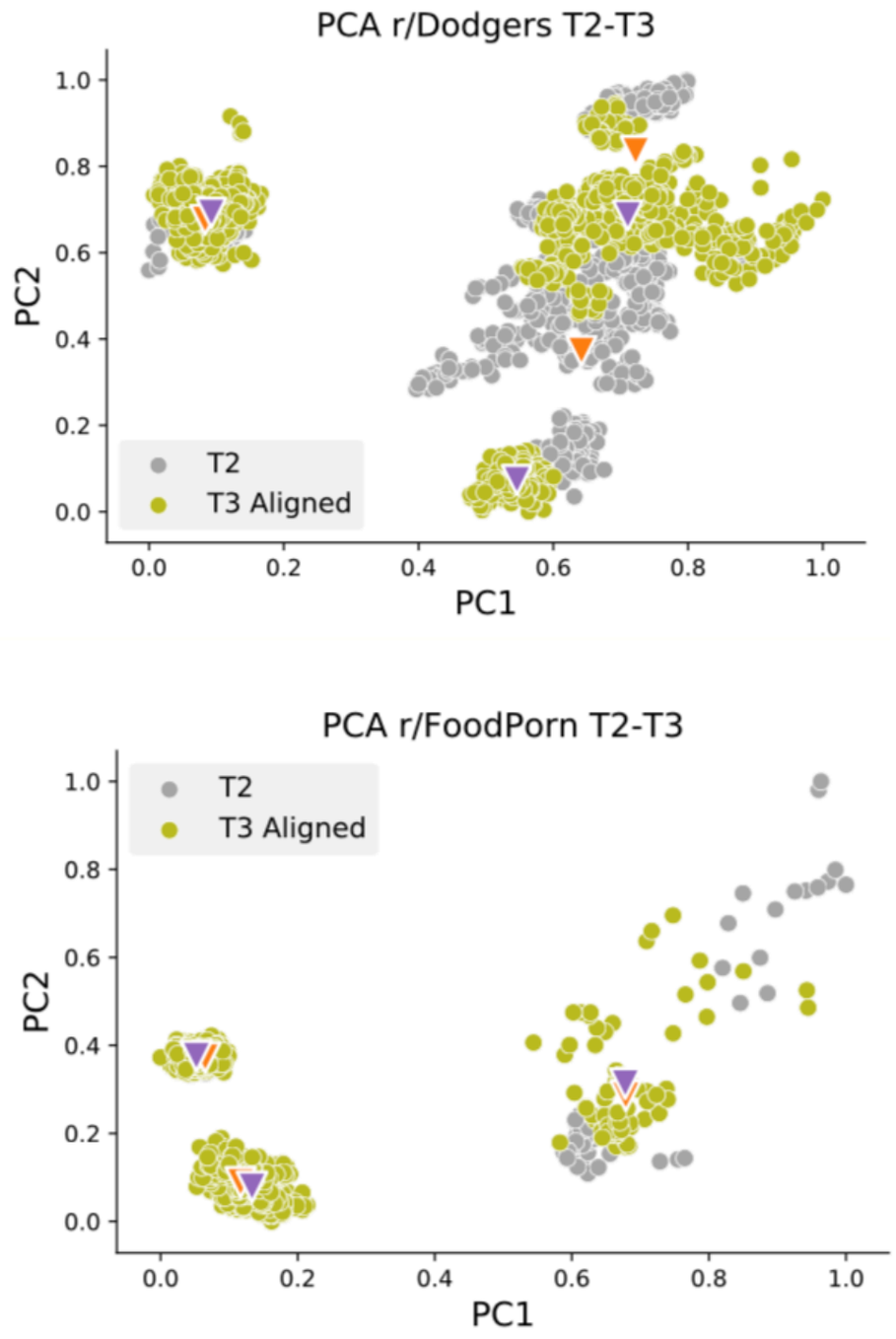


(d) PCA Embeddings

- PCA: (128D -> 2D)
- Cluster No: Elbow Method using Euclidean KMeans
- 1NN to record the Euclidean distance between the closest aligned centroids

3 Results



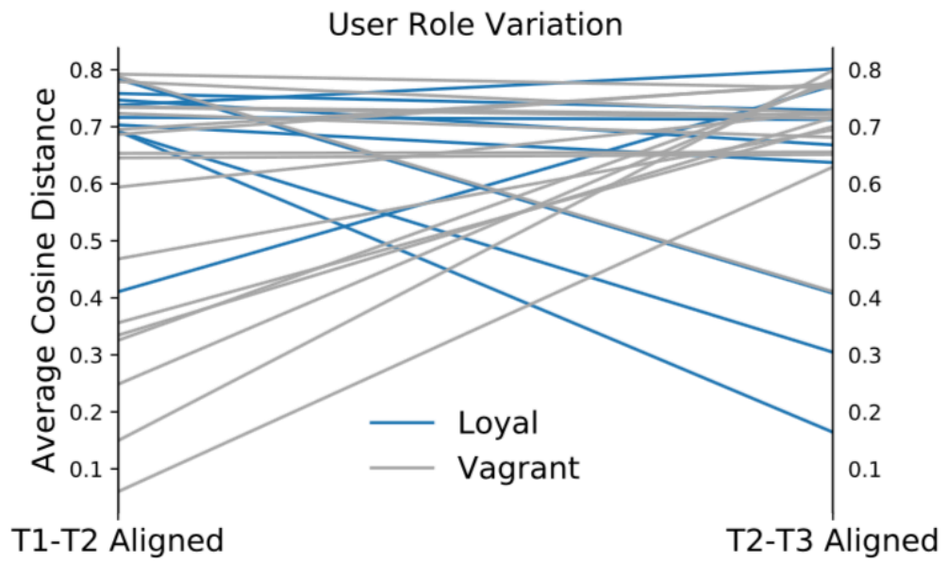


Loyal

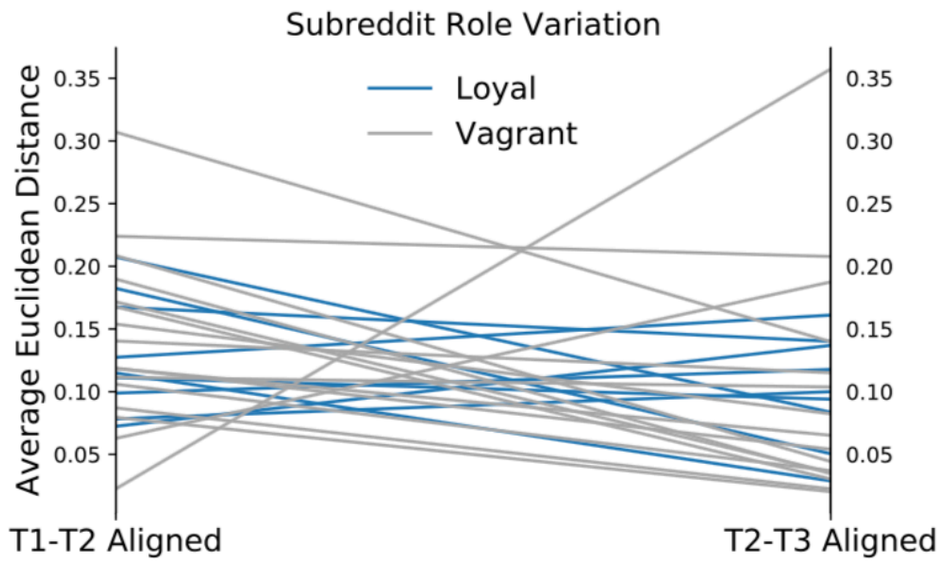
Vagrant

3 Results

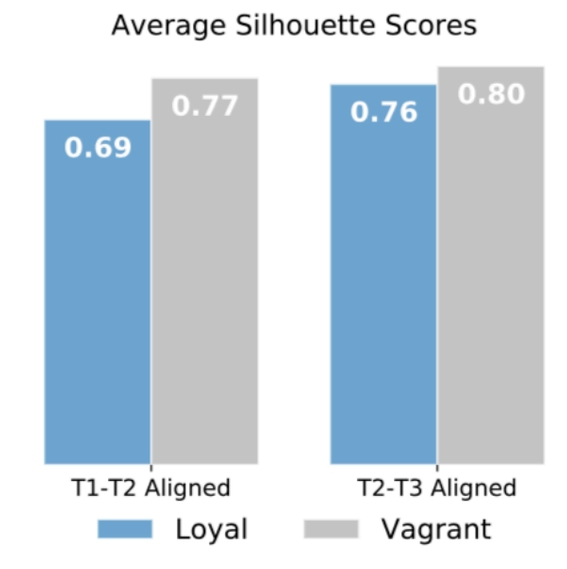
Vagrant participants change roles to a greater extent than loyal participants



(a) User roles are not static.



(b) Community roles are relatively static.



(c) Variation of defined roles.

While loyal participants retain the same role over time in comparison to vagrant participants

4

Thank You!

Questions? Remarks? Suggestions?

I'm in Cambridge
until tomorrow morning

@siobhan_grayson