Graph Learning Network

A Structure Learning Algorithm

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gitlab.com/mipl/graph-learning-network/

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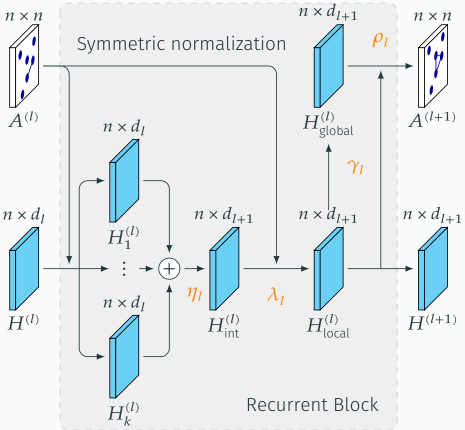
Existing Graph Neural Networks

- Do not support extreme variations over the graph
- Fixed graph’s structure (over the network)

We overcome these issues by ...

- 🛠 Iteratively predict features and adjacency
- 🔄 Repeat (until diminishing returns, five times according to our experiments)

Proposal: GLN



Loss Functions:

- Intersection over Union (IoU) of adjacency
- Class-balanced Cross-Entropy (HED)
- Regularization

$$H^{(l)}_{\text{int}} = \sum_{i=1}^{k} \sigma_l \left(\hat{A}^{(l)} H_i^{(l)} W_i^{(l)} \right)$$

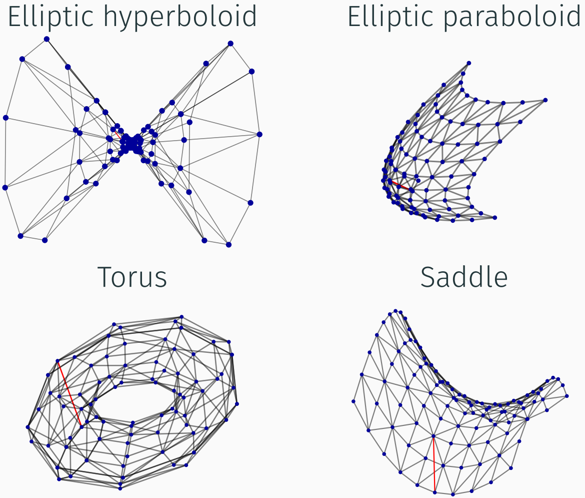
$$H^{(l)}_{\text{local}} = \sigma_l \left(\hat{A}^{(l)} H^{(l)}_{\text{int}} U^{(l)} \right)$$

$$H^{(l)}_{\text{global}} = \sigma_l \left(H^{(l)}_{\text{local}} Z^{(l)} \right)$$

$$A^{(l+1)} = \sigma_l \left(M^{(l)} H^{(l)}_{\text{local}} Q^{(l)} {H^{(l)}_{\text{global}}}^{\top} {M^{(l)}}^{\top} \right)$$

- Learnable matrices
- Non linearities
- Embedding functions

We can predict surfaces



Elliptic hyperboloid

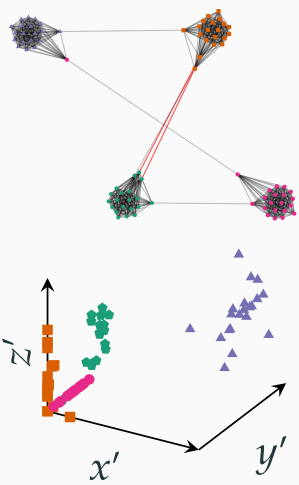
Elliptic paraboloid

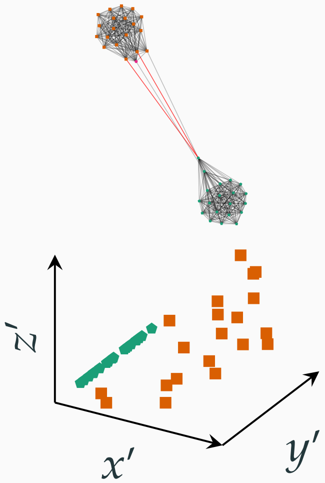
Torus

Saddle

ℹ Not predicted edges (FN), extra predicted edges (FP), and correctly predicted ones.

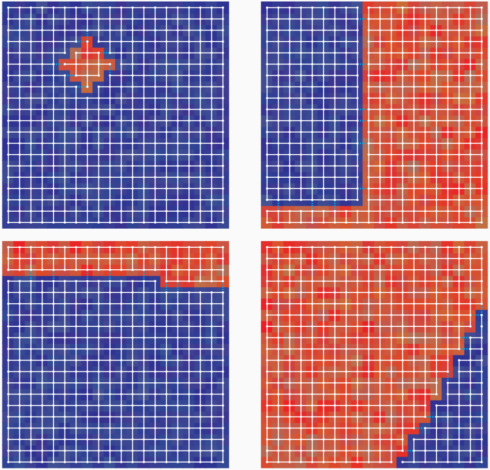
…and communities





ℹ Not predicted edges (FN), extra predicted edges (FP), and correctly predicted ones.

…and segment (simple) images



ℹ Not predicted edges (FN), extra predicted edges (FP), and correctly predicted ones.

Lets talk for more info

Code available:

`gitlab.com/mipl/graph-learning-network/`

How to reach me?

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