**Local and Global Information Fusion for Top-N Recommendation in Heterogeneous Information Network**

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**Background**

- **Local Information**
  - Direct interactions of users and items in HIN
  - Breadth-first search (BFS)

- **Global Information**
  - Indirect interactions between users and items based on different meta-paths.
  - Depth-first search (DFS)

**Heterogeneous Information Network (HIN)**
- Include multiple types of nodes and links
- Model heterogeneous data and contain rich semantics
- **Meta-path**: Semantic paths between two objects in HIN

**Drawbacks of Traditional HIN based Recommendation**
- Treat different local information equally
- Seldom exploit and explore local information and global information simultaneously

**Our idea**
- Learn different weights for different neighbors
- An unified model to extensively exploit the local interaction information and fully explore the global interaction information

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**LGRec : The Proposed Method**

**Model Local Information**
- Encoding user and item
- Co-attention mechanism

\[ M_{i,j} = F(X_{i}^{(l)}A)(Y_{j}^{(l)}) \]

Generate embeddings

\[ a_{ij}^l = MP(M_{i,j})_{X_i}, \quad a_{ij}^l = MP(M_{i,j})_{Y_j} \]

\[ x_{ui} = X_{ui}u^l, \quad y_{vj} = Y_{vj}v^l \]

**Model Global Information**
- **Meta-path based interaction**
- Generate latent relation based on MLP

\[ h_{u,v} = x_{ui} + y_{vj} \]

\[ z = MLP(h_{u,v}) \]

- Multi-label classification

\[ p_z = W_0z + b_0 \]

**Unified Model**

\[ s(u,v,z) = ||x_{ui} + z - y_{vj}||^2 \]

\[ \ell = \ell_{trans}(\alpha) + \ell_{reg}(\beta) \]

**Effectiveness Experiments**

**Datasets**
- Movielens
- LastFM
- Yelp
- Amazon

**Models**
- ItemKNN
- BPR
- FM
- NeuMF
- LRML
- SDVF
- FMG
- LGRec

**Performance**

**Metrics**
- HR@10, NDCG@10

**Compared Methods**
- ItemKNN
- SVD
- FMG
- NeuMF
- LRML

**Conclusion**
- We proposed a unified deep model to fully utilize local and global information for top-N recommendation.
- We learn importance of neighbors by the co-attention mechanism and optimize a multi-label classification problem to capture meta-path based interactions.
- Extensive experimental results show the effectiveness of LGRec.
- More materials in webpage: www.shichuan.org

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**Acknowledgements**

This work is supported in part by the National Natural Science Foundation of China (No. 61772082, 61502502, 61320106006, 61375058), the National Key Research and Development Program of China (2017YFB0803004), and the Beijing Municipal Natural Science Foundation (4182043, 4162032).

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**Effectiveness Experiments**

**Parameters Tuning**

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