A Survey on Learning from Graphs with Heterophily: Recent Advances and Future Directions

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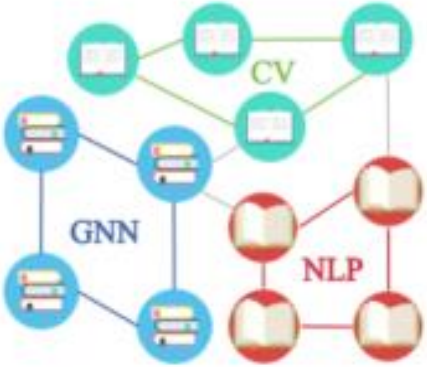
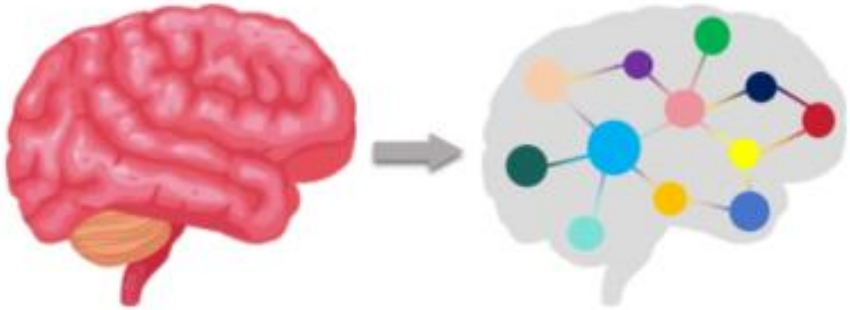
Learning from Graph with Heterophily



A citation network
(Homophily)



A brain network with community structure
(Heterophily)

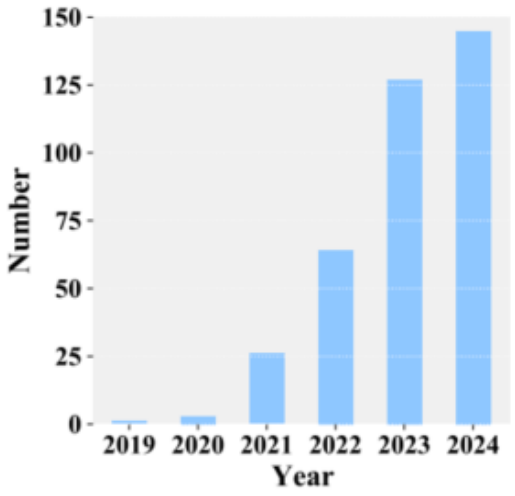
A social network with social bots
(Heterophily)

- Heterophilic graphs, where linked nodes are prone to be with different labels or dissimilar features, have recently attracted significant attention and found many real-world applications.

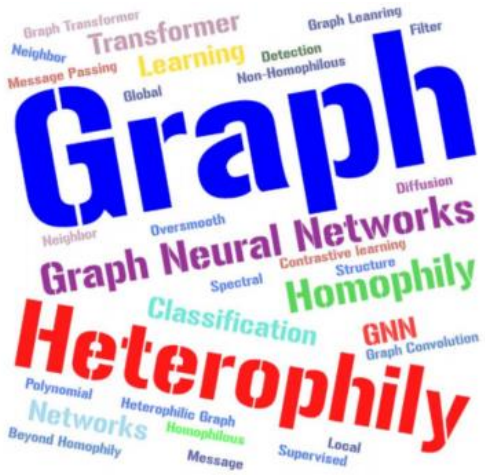
- Traditional GNNs implicitly assume that graphs are homophlic and follow the message passing mechanism. However, this mechanism struggles with graph heterophily.

- To handle graph heterophily, many metrcis, benchmark datasets, learning models and learning topics have emerged recently.

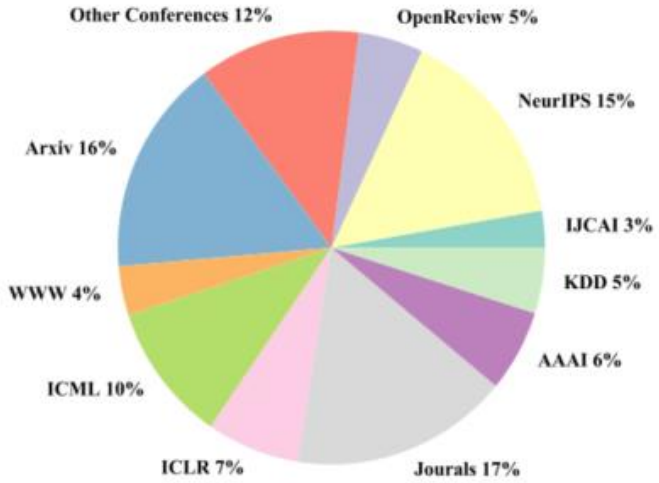
Recent Advances and Future Directions



Number of papers published per year.



The word cloud of collected papers.



The source distribution for the collected papers.

We overview over 500 publications, of which more than 300 are directly related to heterophilic graphs and conduct the most comprehensive survey in the field of graphs with heterophily.