# MAGNN: Metapath Aggregated Graph Neural Network for Heterogeneous Graph Embedding

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Tóm tắt nôi dung—Môt lương lớn các đồ thi hay mang trong thực tế vốn dĩ không đồng nhất, có nhiều loại nút và nhiều loại quan hệ. Embedding đồ thị không đồng nhất là việc embed từ cấu trúc lớn và nhiều thông tin của đồ thị về biểu diễn nút trong không gian thấp chiều. Các mô hình đã tồn tại tường định nghĩa metapaths trong một đồ thị không đầu nhất để ghi lai các quan hệ và đinh hướng lưa chon "hàng xóm". Tuy nhiên các mô hình này bỏ qua đặc trưng của từng nút mà tìm hiểu ngay lập tức các nút trên metapath hoặc chỉ xem xét một metapath. Đế khắc phục ba giới hạn này, tác giả để xuất một mô hình mới là Metapath Aggregated Graph Neural Network (MAGNN) để tăng tốc hiệu năng cuối cùng. Đặc biệt, MAGNN sử dụng ba thành phần chính, biến đổi nội dung của nút thành các thuộc tính đóng gói của nút đầu vào, tổng hợp intra-metapath để kết hợp các nút ngữ nghĩa trung gian và tổng hợp inter-metapath để kết hợp thông tin từ nhiều metapaths. Các thí nghiêm được thực hiện trên ba bộ dữ liệu đồ thị không đồng nhất trong thực tế để phân loại nút, phân cụm nút và dự đoán liên kết chỉ ra rằng MAGNN đạt được kết quả dự đoán chính xác hơn so với các mô hình state-of-the-art hiện tai .

## I. INTRODUCTION

Nhiều bộ dữ liệu thực tế được biểu diễn với cấu trúc dữ liệu đồ thị, trong đó các đối tượng và quan hệ giữa chúng được biểu diễn bằng các nút và cạnh. Các ví dụ bao gồm mạng xã hội [14, 29], hệ thống vật lý [2, 10], mạng giao thông [18, 34], mạng trích dẫn [1, 14, 16], hệ thống gợi ý [26, 35], đồ thị tri thức [3, 24], ... Bản chất non-Euclidean của đồ thị khiến chúng khó được mô hình hóa bằng các mô hình học máy truyền thống. Với tập hàng xóm của mỗi nút, không hề có thứ tự hoặc giới hạn về kích thước, Tuy nhiên, hầu hết các mô hình thống kê giả định rằng một đầu vào có thứ tự và kích thước cố định trong không gian Euclid. Do đó, sẽ thuận tiện nếu các nút có thể được biểu diễn bằng các vector thấp chiều trong không gian Euclid và từ đó có thể lấy làm đầu vào của mô hình học máy khác.

Các kĩ thuật embed đồ thị khác nhau được đề xuất cho cấu trúc dữ liệu đồ thị. LINE [25] sinh node embedding dựa vào các nút gần nhất và gần thứ 2. Các phương pháp dựa trên bước ngẫu nhiên (Random-walk) bao gồm DeepWalk [21], node2vec [13] và TADW [32] sinh dãy nút được sinh ra bởi các bước ngẫu nhiên đến một mô hình skip-gram [19] để học node embeddings. Với sự phát triển nhanh chóng của deep learning, mạng neuron đồ thị (Graph neural networks - GNNs) được đề xuất, mô hình học các biểu diễn đồ thị bằng việc sử

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dụng các lớp neuron được thiết kế đặc biệt. Spectral-based GNNs bao gồm ChebNet [8] và GCN [16] biểu diễn các toán tử tích chập đồ thị trong miền Fourier của một đồ thị đầy đủ.

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$$a + b = \gamma \tag{1}$$

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Bång I TABLE TYPE STYLES

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Head	Table column subhead	Subhead	Subhead
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<sup>a</sup>Sample of a Table footnote.

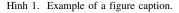


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# ACKNOWLEDGMENT

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#### TÀI LIÊU

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