

# Layered Graph Embedding

for **Entity Recommendation**  
using **Wikipedia**  
in the **Yahoo! Knowledge Graph**



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**Brad Pitt**

American actor and filmmaker

William Bradley Pitt is an American actor and film producer. He has received multiple awards, including two Golden Globe Awards for his acti... [en.wikipedia.org](https://en.wikipedia.org)

Born: December 18, 1963 (age 56), Shawnee, Oklahoma, USA

## People also search for



Angelina  
Jolie



Jennifer  
Aniston



Tom Cruise



Justin  
Theroux



George  
Clooney



Wiki



IMDb

# Layered Graph Embedding in a nutshell

“Construct embeddings by bias random walks on separate sub-graphs as layers.

- **Embedding Generation:**

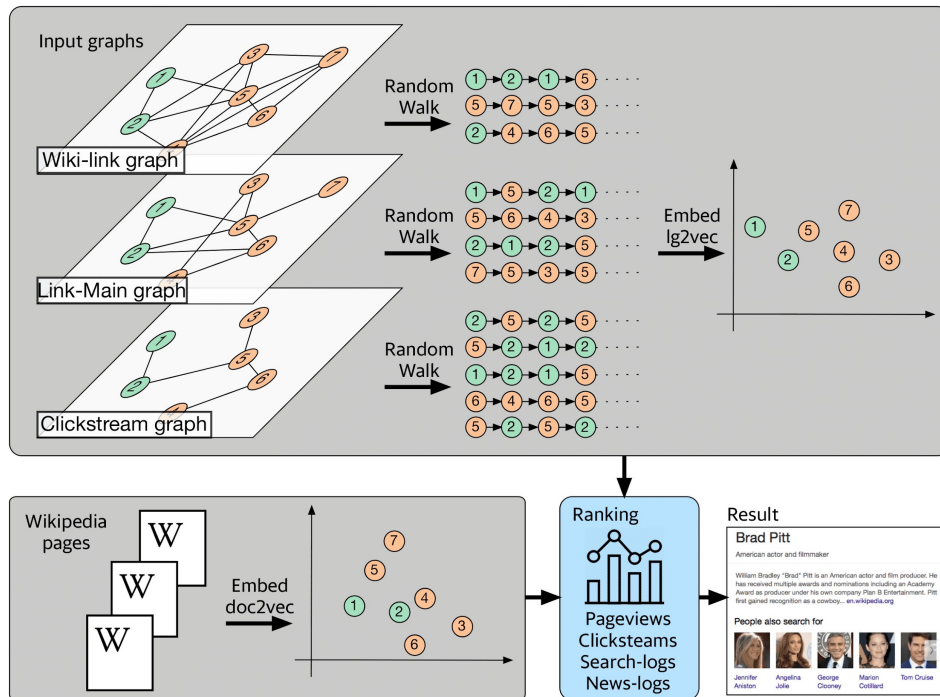
- **Wiki-link graph layer**
  - Top 10 wiki languages are used.
- **Link-Main graph layer**
  - Link appears inside main text extracted with *Wikiextractor*.
- **Clickstream graph layer**
  - Sum last 12 months as edge weights.

- **Candidate Generation:**

- *knn* in *Ig2vec* & *doc2vec*.

- **Ranking:**

- *Ig2vec* & *doc2vec* cosine similarity.
- Pageviews, clickstreams, search-logs.



# Results

- Generic recommendations that can be tuned/filter by types and languages.
- Recommendations (almost) 100% powered by Wikipedia.
- Dataset to be made **publicly available** soon.
- #Discuss Session:
  - **Modeling & embeddings**

### People to people



Donald Trump    Melania Trump    Barack Obama    Ivanka Trump    Mike Pence

### People to company



Elon Musk    SpaceX    Tesla, Inc.    The Boring Company    Zip2

### Event to people



Me Too Movement    Tarana Burke    Harvey Weinstein    Alyssa Milano    Rose McGowan

### Sport competitions



World Marathon Majors    Berlin Marathon    Chicago Marathon    London Marathon    Boston Marathon

### General entities



Nonsteroidal Anti-Inflammatory Drug    Paracetamol    Ibuprofen    Aspirin    Diclofenac

### Internationalization



甄子丹    李連杰    葉問    洪金寶    成龍  
Donnie Yen    Jet Li    Ip Man    Sammo Hung    Jackie Chan