

Software Engineering Department  
Braude College

Capstone Project Phase B – 61999

**Citation networks evolution using Dynamic Network Embeddings**

**User Guide**

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[GIT Repository Link](https://github.com/AvishayBR/Degree_FinalProject.git)

**1. System Purpose**

**The system analyzes the dynamic development of academic papers using learned representations (embeddings) of citation networks over time.  
The goal is to classify papers based on their behavior across years:**

* **Rising Stars: Consistently increasing influence**
* **Emerging: Recently published papers that suddenly gained attention**
* **Falling Stars: Previously influential papers that are losing relevance**
* **Steady: Foundational works with stable long-term influence**

**2. Prerequisites**

* **No local installation required**
* **The only thing users need to do is run the Google Colab notebook provided.**
* **Access to .jsonl files with the appropriate format (usually organized by year, e.g., papers\_2000.jsonl, papers\_2001.jsonl, etc.)**
* **GPU (Google Colab provides an A100 GPU by default – recommended)**

**3. Running the System**

1. **Open the notebook (e.g., Dynamic\_Citation\_Network\_Analysis.ipynb) in Google Colab**
2. **Upload the data directory or mount your Google Drive (if the data is stored there)**
3. **Ensure that the following fields exist in the input files:**
   * **id – unique identifier for each paper**
   * **year – year of publication**
   * **references – list of paper IDs this paper cites**
4. **Configure the parameters at the beginning of the notebook (e.g., year range, data path, etc.)**
5. **Run all cells (Runtime > Run all)**

**4. System Output**

**After full execution, the system will generate:**

* **Embedding files by year (M\_<year>.pt)**
* **Shared transformation matrix (alpha.pt)**
* **Yearly graph snapshots (G\_<year>.pkl)**
* **Paper classification output (CSV)**

**5. Common Issues**

| **Issue** | **Solution** |
| --- | --- |
| **File loading error** | **Make sure the data\_dir is correctly defined and contains .jsonl files** |
| **Memory error** | **Make sure a GPU is active (Colab menu: Runtime > Change runtime type > GPU)** |
| **Execution stopped mid-run** | **Use the --resume parameter to continue from the last completed year** |

**6. Creating Graphs and Analyzing Results (Optional)**

* **You can run dedicated cells at the end of the notebook to generate visualizations that demonstrate how papers change over time.**
* **All papers will automatically be labeled based on their influence trajectory across years.**