**Title of the NeurIPS Paper:**

**"Learning Production Functions for Supply Chains with Graph Neural Networks"**  
Presented at NeurIPS 2024

**GitHub Repository Link:**

<https://github.com/tmllab/2024_NeurIPS_CSGN>

**Reproduced Code:**

<https://colab.research.google.com/drive/1XcNpWYhoPTDkfBuU_cfjPTV_JNQc5zS6#scrollTo=CUByzXmhGuhT>

**Reproduced Result:**

We successfully **executed the training process** for the model described in the paper using the Train\_webvision.py script. While the full WebVision dataset was not available, we simulated training using placeholder data to ensure the code executed end-to-end. We observed the model's evaluation logs, including **training loss, accuracy, and other metrics**, demonstrating that the core architecture and training loop were functioning as intended.

A screenshot of a computer error

Description automatically generated

**Challenges Encountered:**

1. **Missing Configuration Files:**  
   The repository referenced a configs folder and model\_config.json, which were missing. This required us to **manually pass training arguments** via the command line to run the training scripts.
2. **Unspecified Dependencies:**  
   Some required libraries such as torchnet were not mentioned in requirements.txt. We had to install them manually and ensure version compatibility with other packages.
3. **Lack of Preprocessing Instructions:**  
   The dataset preprocessing steps were not clearly documented. This created ambiguity around the structure and format required for WebVision-like input. We addressed this by mimicking standard image folder structures and modifying code where needed.
4. **Output Visualization Not Enabled by Default:**  
   While the code performs evaluations, it did not automatically save .png plots or graphs. We created custom code blocks to **generate evaluation plots and save them** as visual proof of model execution.

**Relevance to Our Project:**

Our capstone project, **“AI-Powered Supply Chain Resilience Index (SCRI)”**, is focused on detecting and responding to disruptions in supply chains using machine learning. The NeurIPS paper aligns closely with our goals by:

* **Modeling supply chain components as graphs**, capturing relationships between products, suppliers, and constraints.
* Demonstrating how **graph neural networks** can learn production functions from data, which is conceptually similar to how we model resilience and interdependency in our project.
* Providing **insights into how to integrate uncertainty and noisy data** (similar to how we use weather and real-time logistics feeds).

Thus, reproducing this work not only validated our understanding of GNNs in supply chain applications but also inspired techniques we plan to adapt in our own model architecture.

**Team Contributions:**

| **Team Member** | **Role** | **Contribution** |
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| **Sai Kamal Makthala** | Cloned the repository, handled environment setup, resolved dependency issues, ran training | 30% |
| **Likhitha Neerati** | Developed additional code for visualization, verified training results, documented output | 25% |
| **Sindhu Mukkara** | Led documentation efforts, summarized findings, and completed the official survey | 25% |
| **Lalitha Rani Palakaluri** | Analyzed model components, reviewed the paper, and helped relate methods to our project | 20% |