**Sprint-2**

**Introduction**

In this Sprint, the purpose was to develop code for autoencoder training and topology inference. The following sections contain the User Stories I worked on with a detailed description of the Tasks I worked on.

**User Stories**

I worked on the following User Stories:

[SNIF: Stock Network Inference Framework #599](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599)

**Conditions of Satisfiability:**

* Data Integrity: Return matrix contains no NaNs; missing values handled.
* Model Correctness: Autoencoder and GCN+LSTM accept correct tensor shapes and produce valid outputs.
* Performance: Full inference pipeline (topology build + GCN+LSTM → JSON) runs in ≤ 5 s.
* Robustness: Pipeline tolerates days with low volatility or missing tickers without crashing.
* Integration: Crew AI DecisionAgent consistently maps snif\_prob thresholds to valid recommendations.

**Definition of Done:**

* Return ingestion, autoencoder, topology inference, GCN+LSTM, inference API, and Crew AI integration are all implemented.
* Unit tests and integration tests covering every module pass.
* Performance benchmarks meet latency targets.
* README and inline documentation updated.
* Crew AI DecisionAgent returns correct BUY/SELL/HOLD in end-to-end tests.
* Backtesting harness implemented and performance report generated.

**Tasks**

[SNIF.1 Return Data Ingestion (8 ph) #600](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/600)

[SNIF.2 Autoencoder Training (8 ph) #621](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621)

[SNIF.3 Topology Inference (5 ph) #632](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/632)

[SNIF.4 GCN+LSTM Model Development (10 ph) #633](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/633)

[SNIF.5 Inference API (5 ph) #634](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/634)

[SNIF.6 Crew AI DecisionAgent (4 ph) #635](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/635)

[SNIF.7 Integration & Validation (9 ph) #636](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/636)

[SNIF.8 Backtesting & Evaluation (9 ph) #637](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/637)

**Tasks I Worked On**

[SNIF.2 Autoencoder Training (8 ph) #621](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621)

I have built encoder/decoder architecture and trained on reconstruction loss and monitor validation error. The task is estimated at 8 person hours but took 17 to complete.

[SNIF.3 Topology Inference (5 ph) #632](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/632)

I have computed cosine similarities on embeddings and sparsify into adjacency matrices. The task is estimated at 5 person hours but it took me 14 hour to complete.

**Summary Table of Work**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| UserStory GitHub Issue ID | User Story | Story Points | Task GitHub Issue ID | Task | Task Hours | Status | Actual Hours |
| [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | Stock Network Inference Framework |  | [SNIF.2](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621) | Autoencoder Training (8 ph) #621 | 8 | Complete | 17 |
| [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | Stock Network Inference Framework |  | [SNIF.3](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/632) | Topology Inference (5 ph) #632 | 5 | Complete | 14 |

**Summary Table of Commits**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Commit Number | Commit Description (exactly as in github) | User Story | Task |
| June 22nd, 2025 | 1a640cd71807236dd4c9e788af87f4daa5ec1da5 | [Add SNIF init forward encode functions](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/pull/761/commits/1a640cd71807236dd4c9e788af87f4daa5ec1da5) | [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | [SNIF.2](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621) |
| June 22nd, 2025 | b1a81fe3869f9624ce5a8eb7aff01193c02bc18a | [Add prepare dataloaders and train functions](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/pull/761/commits/b1a81fe3869f9624ce5a8eb7aff01193c02bc18a) | [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | [SNIF.2](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621) |
| June 22nd, 2025 | ed31fa9b2dc9aa60b561ef9672568cdda3bb7601 | [Add load encoder extract embeddings save encoder](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/pull/761/commits/ed31fa9b2dc9aa60b561ef9672568cdda3bb7601) | [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | [SNIF.2](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/621) |
| June 22nd, 2025 | b0b2f80cd3d9d0a25730c7c5da740741d2c9af5b | [Add topology inference code](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/pull/761/commits/b0b2f80cd3d9d0a25730c7c5da740741d2c9af5b) | [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | [SNIF.3](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/632) |
| June 22nd, 2025 | 85f4bbca18a29daef28ba5834410dad700dcdc24 | [add topology main code](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/pull/761/commits/85f4bbca18a29daef28ba5834410dad700dcdc24) | [SNIF](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/599) | [SNIF.3](https://github.com/Rivier-Computer-Science/AI-Agent-Stock-Prediction/issues/632) |