

# **AI-Powered Financial Forecasting Toolkit**

## **Overview**

This toolkit leverages advanced machine learning models to analyze financial time series data and generate trading recommendations. It includes:

- CNN + LSTM + Attention
- Graph Neural Networks (GNN)
- Deep Q-Networks (DQN)
- Hidden Markov Models (HMM)
- Neural ODEs
- Feature-rich Streamlit app for interactive analysis

Supports real-time data from Financial Modeling Prep, optional sentiment and trends integration, and an ensemble smart-voting engine.

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## **Requirements**

- Python 3.9+
- Recommended: Create a virtual environment

Install dependencies:

```
pip install -r requirements.txt
```

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## API Keys

Set the following environment variables:

```
export FMP_API_KEY=your_fmp_api_key
export NEWS_API_KEY_NEWSAPI=your_newsapi_key # optional
export NEWS_API_KEY_FRED=your_fred_key      # optional
```

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## Running the App

Launch the Streamlit dashboard:

```
streamlit run ng.py
```

### Sidebar Features:

- Select ticker symbols (crypto, indices, commodities)
  - Optionally enable Google Trends and News/Economic indicators
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## Model Training (Pro & Commercial)

Run the training scripts in `train.py` for each model:

### Train CNN + LSTM + Attention:

```
python train.py # calls train_cnn_lstm_attention()
```

### Train DQN agent:

```
train_DQN(df, scaler, ticker)
```

### Train GNN model:

```
train_GNN(df)
```

### Train Neural ODE model:

```
train_neural_ode(df)
```

Output models will be saved in:

- `model/{ticker}_cnn_lstm_attention_model_tuned.h5`
  - `gnn_model.pth`
  - `dqn_model_{ticker}.zip`
  - `neural_ode_func.pth`
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## File Structure

```
/project-folder
├── ng.py           # Streamlit app
├── train.py        # Model training code
├── requirements.txt # Python dependencies
├── model/          # Trained models
└── README.md       # This setup guide
```

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## Troubleshooting

- **Missing module:** Run `pip install package-name`
  - **Streamlit not launching:** Check Python version and ensure `streamlit` is installed
  - **API key errors:** Verify environment variables are set correctly
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## FAQ

- **Can I use this without training?** Yes, if models are preloaded.
- **Is GPU required?** No, but it's recommended for training.
- **Which assets are supported?** Any ticker supported by FinancialModelingPrep, including indices, crypto, and commodities.

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For issues, suggestions, or customization requests, feel free to contact the author or open an issue on the project repository.

Happy Trading! 