GSDC
Global Skill Development Council

Generative AI In Finance And Banking

Cheat Sheet

Visit Our Website
www.gsdcouncil.org

Key Definitions to Remember

Generative AI

AI that learns patterns from data and generates new data resembling the original. Used for synthetic datasets, scenario simulation, fraud modeling, and autonomous decisions.

GAN (Generative Adversarial Network)

Consists of a Generator (creates data) and Discriminator (evaluates data). GANs generate realistic financial data like stock prices or fraud transactions.

VAE (Variational Autoencoder)

Compresses data into a latent space and reconstructs it. VAEs are used for anomaly detection and generating alternative financial scenarios.

Time Series Analysis

Predicting future values based on historical sequential data. Important in stock prediction and risk modeling.

LSTM / GRU

RNN variants capable of capturing long-term dependencies in sequential data. Useful for forecasting prices or financial metrics.

NLP (Natural Language Processing)

AI methods to analyze and generate human language. Applications include sentiment analysis on financial news or earnings calls.

Credit Scoring

Quantitative assessment of borrower creditworthiness using models like Logistic Regression or Decision Trees. Key metrics include PD, LGD, and EAD.

Fraud Detection

Identifying anomalous or suspicious transactions. Can use Autoencoders, GANs, or rule-based methods.

Agentic AI

AI capable of autonomous actions to achieve goals, such as trading bots or autonomous portfolio management.

Explainability

Ensuring AI model decisions are understandable and interpretable, critical in finance for compliance and regulation. Tools include SHAP and LIME.

Exploring Generative AI

Generative AI refers to AI systems that learn patterns and structure from historical data to create new, realistic outputs, rather than simply predicting outcomes. It focuses on data generation.

Generative AI can simulate rare market conditions, generate synthetic datasets when real data is limited, and enhance the robustness of financial models. In finance, generative models help institutions stress-test portfolios, model risk, and detect anomalies.

Applications in Finance:

- Synthetic stock or index data for backtesting strategies.
- Generating customer profiles for risk assessment and credit scoring.
- Simulating rare market events for scenario analysis.

Tools: Python, PyTorch, TensorFlow.

> **Tip:** Understand how generative AI differs from predictive AI; it focuses on creation rather than prediction.

Machine Learning Fundamentals

Machine Learning (ML) refers to algorithms that learn patterns from data and make predictions or decisions without being explicitly programmed.

ML forms the foundation for generative AI in finance. It is used for risk assessment, fraud detection, credit scoring, and market prediction. ML models can be:

Key Algorithms:

- Regression: Linear, Logistic
- Decision Trees & Random Forests
- Clustering: K-Means, DBSCAN
- Neural Networks for deeper modeling

Finance Use Cases:

- Loan approvals and credit scoring
- Customer segmentation
- Fraud detection

Supervised

Predict outcomes using labeled data (e.g., predicting default risk).

Unsupervised

Detect patterns in unlabeled data (e.g., clustering customers for marketing or fraud detection).

Reinforcement Learning

Learn via trial-and-error to achieve a goal (e.g., automated trading strategies).

Tip: Always preprocess data carefully (normalization/scaling) and split data for training, validation, and testing.

Delving into Deep Learning

Deep Learning (DL) is a subset of ML using multi-layered neural networks to model complex relationships in data.

DL is critical for capturing non-linear patterns and high-dimensional data in finance. It powers generative models like GANs, VAEs, and sequential models like LSTM/GRU.

Key Concepts:

Layers

Input → Hidden → Output

Activation Functions

ReLU (common), Sigmoid (for probabilities), Tanh

Loss Functions

MSE for regression, Cross-Entropy for classification

Optimizers

SGD, Adam, RMSProp

Applications in Finance:

- Stock price prediction
- Anomaly detection in transactions
- Algorithmic trading strategies

Generative Adversarial Networks (GANs) in Finance

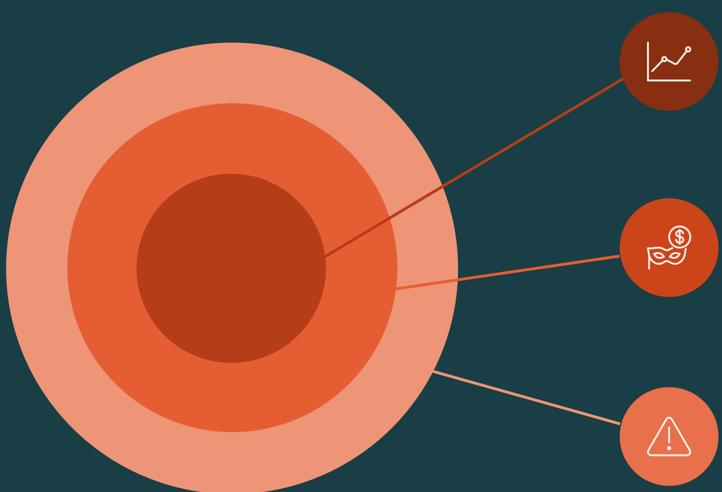
GANs consist of two neural networks in competition: the Generator creates synthetic data, while the Discriminator evaluates its authenticity.

Description & Finance Context: GANs allow financial institutions to generate realistic synthetic data, helping with backtesting, anomaly detection, and training models in scenarios where data is scarce.

Loss Function:

$$\min_G \max_D V(D,G) = E[\log D(x)] + E[\log(1 - D(G(z)))]$$

Applications in Finance:



Stock Path Simulation

Modeling potential future stock price movements.

Synthetic Fraud Data

Generating realistic but artificial fraud scenarios.

Stress Test Portfolios

Evaluating portfolio performance under extreme conditions.

Tips: Training GANs can be unstable. Monitoring Generator and Discriminator losses helps maintain balance. GANs are powerful for rare-event simulation.

Variational Autoencoders (VAEs) in Finance

VAEs encode data into a latent probabilistic space and decode it back to reconstruct data.

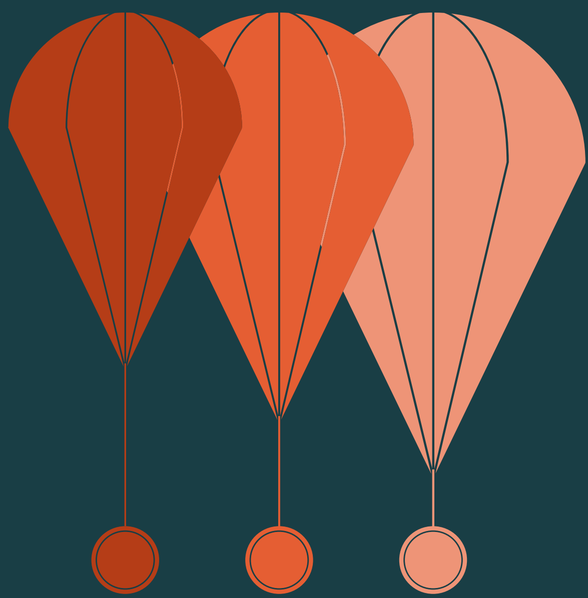
VAEs can detect anomalies, simulate alternate market scenarios, and reduce dimensionality of complex financial datasets. Unlike GANs, VAEs provide interpretable latent spaces.

Loss Function:

Loss = Reconstruction Loss + KL Divergence

Applications in Finance:

- **Anomaly Detection**
  Identifying unusual patterns and outliers.
- **Stress Scenario Gen**
  Creating test cases for system resilience.
- **Portfolio Risk**
  Assessing potential losses in investments.



Tip: The latent space allows "what-if" analysis of financial situations not present in historical data.

Time Series Analysis with Generative Models

Time Series Analysis predicts future values using historical sequential data.

Time-dependent financial data (stocks, FX rates, interest rates) requires models that capture patterns over time. Generative models like TimeGAN combine time-series forecasting with data generation.

Models	Metrics
LSTM, GRU, TimeGAN	RMSE, MAE, MAPE

Applications in Finance:

Portfolio Returns

Calculating the gains or losses on investment collections.

Price Forecasting

Analyzing market trends to predict future asset prices.

Risk Exposure

Assessing potential for financial loss in investments.

Tip: Feature engineering, proper sequence length, and normalization are key for accurate predictions.

NLP and Sentiment Analysis in Finance

NLP involves analyzing, interpreting, and generating textual data.

Financial decisions often rely on textual data: earnings calls, news, and reports. NLP converts this text into actionable insights, enabling sentiment-based predictions.

Steps:

1. Text cleaning
2. Tokenization
3. Lemmatization
4. Vectorization
5. Sentiment Scoring

Models: FinBERT, GPT, Hugging Face Transformers

Applications in Finance:

Tip: Combine textual sentiment with quantitative market data for better forecasting.

Fraud Detection in Finance

Detecting anomalous or suspicious financial transactions.

Fraud detection is crucial for banks and payment systems. Generative models help augment limited fraud data to improve model accuracy.

Models:

Autoencoders, GANs, Random Forest, Isolation Forest

Metrics:

Precision, Recall, F1-Score, AUC-ROC

Applications:

- Detecting credit card fraud
- Transaction monitoring in banking
- Anti-money laundering (AML) alerts

Tip: Rare-event datasets require synthetic augmentation with GANs or oversampling.

Credit Scoring and Risk Assessment

Assessing a borrower's creditworthiness quantitatively. Financial institutions calculate metrics to evaluate the probability of default and potential losses. Transparency is critical for regulatory compliance.

PD	LGD	EAD
Probability of Default	Loss Given Default	Exposure at Default

Models:

Logistic Regression, Decision Trees, XGBoost

Applications:

- Loan approvals
- Portfolio risk evaluation
- Stress testing

Tip: Use SHAP or LIME for explainable AI models to meet regulatory standards.

Algorithmic Trading with Generative Models

AI-driven trading strategies that automate buy/sell decisions. Generative AI can simulate market conditions and forecast trends, helping traders optimize algorithmic strategies.

Models

TimeGAN, Variational RNN

Applications:

- Backtesting trading strategies using synthetic market scenarios
- Predicting stock trends
- Optimizing portfolio allocation

Tip: Combine synthetic and historical data for more robust strategy testing.

Model Interpretability and Explainability

Making AI decisions transparent and understandable.

In regulated finance, black-box models are insufficient. Explainability ensures compliance and trust.

Techniques:

SHAP, LIME, attention mechanisms

Applications:

- Explain credit scoring models
- Interpret fraud detection outputs
- Justify portfolio decisions

> **Tip:** Always be ready to explain why a model made a decision.

Models and Concepts

GANs:

- Consist of Generator (produces synthetic data) and Discriminator (evaluates if data is real).
- Loss Function: min_G max_D V(D,G) = E[log D(x)] + E[log(1-D(G(z)))].
- Applications: Synthetic stock price generation, fraud detection datasets, stress-testing portfolios.
- Tip: Generator tries to fool the Discriminator; training is adversarial.

VAEs:

- Encoder compresses data into latent space; Decoder reconstructs data.
- Loss = Reconstruction Loss + KL Divergence.
- Applications: Detect anomalies, simulate alternative market scenarios, reduce data dimensionality.
- Tip: Latent space captures key features of financial datasets.

Time Series Models (LSTM / GRU):

- Handle sequential dependencies, ideal for stock price prediction or portfolio risk modeling.
- Metrics: RMSE, MAE, MAPE.
- Tip: Proper feature scaling and sequence preparation are crucial.

NLP Models:

- FinBERT, GPT, Hugging Face Transformers for financial text.
- Applications: Sentiment analysis of earnings calls, financial news, or reports.
- Preprocessing: Tokenization, lemmatization, stopword removal.
- Tip: Combine sentiment with market data for predictive analytics.

Key Metrics to Remember

Credit Scoring & Risk Assessment:

- Logistic Regression, Decision Trees, XGBoost commonly used.
- Metrics: PD (Probability of Default), LGD (Loss Given Default), EAD (Exposure at Default).
- Tip: Use SHAP or LIME for model explainability to satisfy regulators.

Fraud Detection:

- Autoencoders or GANs detect anomalous patterns in transactional data.
- Metrics: Precision, Recall, F1-Score, AUC-ROC.
- Tip: Rare-event data may require augmentation with synthetic examples.

Agentic AI:

- Combines LLMs, Generative AI, and Reinforcement Learning.
- Applications: Autonomous trading, portfolio rebalancing, risk monitoring.
- Tip: Focus on both strategy creation and safe execution rules.

Key Metrics to Remember

- **Regression:** RMSE = $\sqrt{\text{mean}((y\_pred - y\_true)^2)}$, MAE = mean(|y_pred - y_true|)
- **Classification:** Accuracy = (TP + TN) / Total, Precision = TP / (TP+FP), Recall = TP / (TP+FN), F1-Score = 2*(Precision*Recall)/(Precision+Recall)
- **Fraud Detection:** AUC-ROC for model performance evaluation
- **Credit Risk:** PD, LGD, EAD

GSDC
Global Skill Development Council

CERTIFICATION IN GENERATIVE AI IN FINANCE AND BANKING

ABOUT GSDC CERTIFICATION

EBOOK

Extensive and exclusive Ebook created by world's experts to help you with understanding core concepts.

LEARNING MATERIALS

Get access to learning materials such as videos, ebooks, templates, and practice exams, which will help you clear the certification exam.

CREATED BY EXPERTS

GSDC certifications are created and authored by world's leading experts in the field.

LEARNING OBJECTIVE

- Gain insights into autonomous decision-making processes
- Apply knowledge using ready-to-implement templates
- Demonstrate ability to work with Agentic AI models
- Validate your skills wit

Enroll now with the code **LEARN20** To avail **20%** discount

Enroll Now

www.gsdcouncil.org