# Building a model credit Ratings System with Machine Learning

Credit ratings play an essential role in the economy by providing early warnings about distressed companies, sectors, or countries, which can lead to significant economic disruptions, as seen in events like the dot-com bubble and the financial crisis. Silicon Valley Bank is a recent example of such a scenario.

Yet building an effective quantitative credit rating system isn’t easy. It needs to be **complex** enough to model sophisticated relationships, but also **transparent and explainable** to explain to clients, and **adaptive** to adjust to new data as it arrives.

The modern tools provided by machine learning are well-suited to meet these criteria effectively. This integration enhances the accuracy and responsiveness of credit ratings, ultimately contributing to a more stable economic environment.

In this article I will look at the steps to building creatings ratings with machine learning models how to:

* Analyse the altman Z score(original bankruptcy model)
* build a highly accurate model using complex, non-linear algorithms
* build transparent and explainable models
* Discuss adaptive models

## Background

It is instructive to look at the what is considered the “founding model” in quantitative bankruptcy prediction – the Altman Z-score. This was a ratio based model that set the foundation for many subsequent models to come. It was surprising effective model with only five input which were ratios taken from the financial statements of a company.

[Altman’s Z-Score Model - Overview, Formula, Interpretation (corporatefinanceinstitute.com)](https://corporatefinanceinstitute.com/resources/commercial-lending/altmans-z-score-model/)

Chart with Altman Z-score leading up to the dot.com bubble

## The strengths and weaknesses of the altman Z-score

## Building High accuracy models

## Explainability vs Accuracy Trade-off

[Arya-XAI - A distinctive approach to explainable AI](https://blog.arya.ai/arya-xai-a-distinctive-approach-to-explainable-ai/)

Table with accuracy, explanability columns

Essential to mention how you are not overfitting and using out-of-sample to test.

There is a lot of AI/ML content coming through our feeds, but not a lot regarding specific domains. I believe more time needs to be spent on showing how it is helpful to particular domains and practical applications. In this mind, I’m going to write a series of articles specifically focused on AI in Finance. This is a domain I worked for over a decade.

To start with I look at the credit ratings space, which is where I spent a lot of time. I’ll write on a series of important topics in this area that I came up during the many years working in this space. Machine learning is particular well suited to measuring financial risk and I’ll show how to use these techniques so practioneers can make informed decisions in this area.

The first topic will be model complexity vs interpretability. We all want our models to be as accurate as possible but it’s often essential in finance for them to be clearly understandable as well.

[US Company Bankruptcy Prediction | 100% accuracy🎯 (kaggle.com)](https://www.kaggle.com/code/broendsholm/us-company-bankruptcy-prediction-100-accuracy)

[US Company Bankruptcy Prediction: 93% Accuracy (kaggle.com)](https://www.kaggle.com/code/utkarshx27/us-company-bankruptcy-prediction-93-accuracy)

Story telling!