SOLASAI

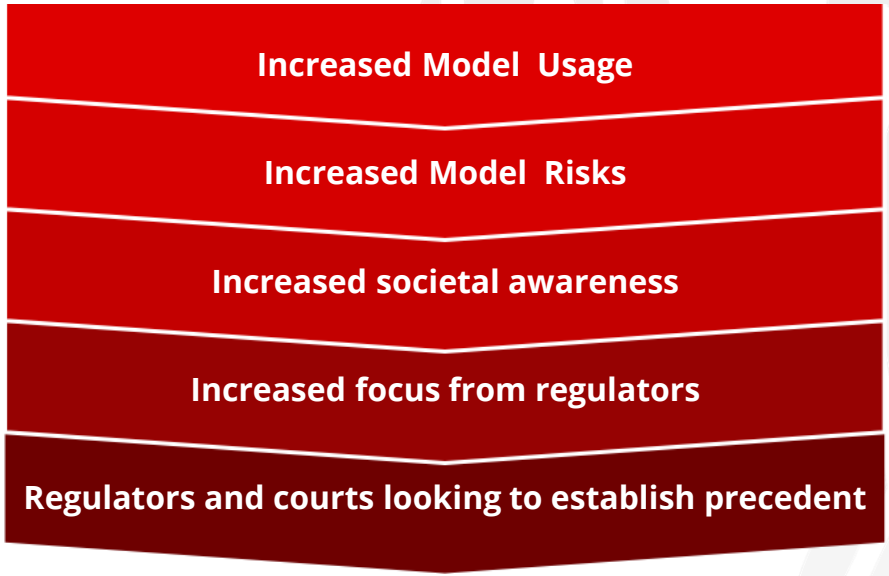
Disparate Impact Mitigation and Proxy Detection Software

Why does your business need a robust model fairness pipeline?

Multiple forces are converging.

Enterprises must gain deep insight into their predictive models.

- ✔ Test for disparity
- ✔ Identify opportunities to reduce disparity
- ✔ Provide clarity on trade-off decisions between business value and reducing disparities



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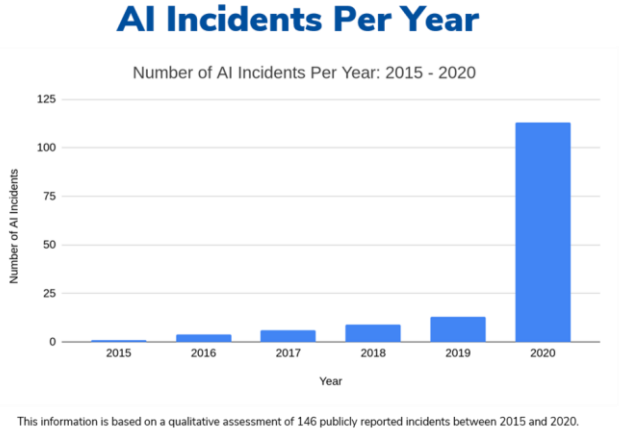
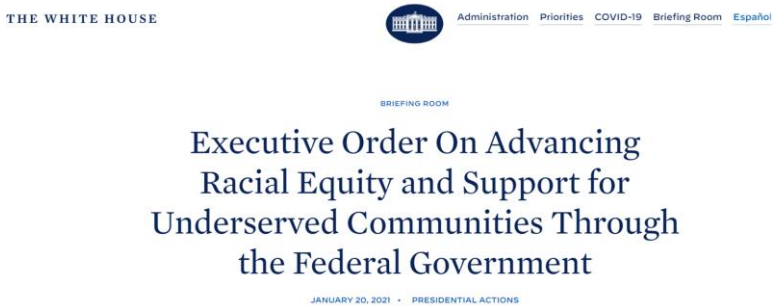
Powerful Social & Industry Trends Requiring Automated and Intelligent Analytics Regulatory Governance



Through 2025, 80% of organizations seeking to scale digital business will fail because they do not take a modern approach to data and analytics governance.

Souce: Gartner, 2021.



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https://www.bnh.ai/
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What is **SolasAI**?

- A software application designed to easily guide you through our unique process of detecting disparity in the models you build
- Subsequently identify alternative models that are lower in disparity, while maintaining the original model's quality
- Our self-service product allows modeler stakeholders to review, analyze, and make decisions related to fair lending in an efficient and transparent way

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Created by industry-leading consultants and data scientists

45 years in Employment Discrimination Analytics	**25 years** in Fair Lending Analytics	Consultants to **over 50% of the Fortune 50**	Virtually **every major lending institution** in the U.S use our framework for fair lending	Provide expert consulting to numerous Federal, State, and Local Regulators

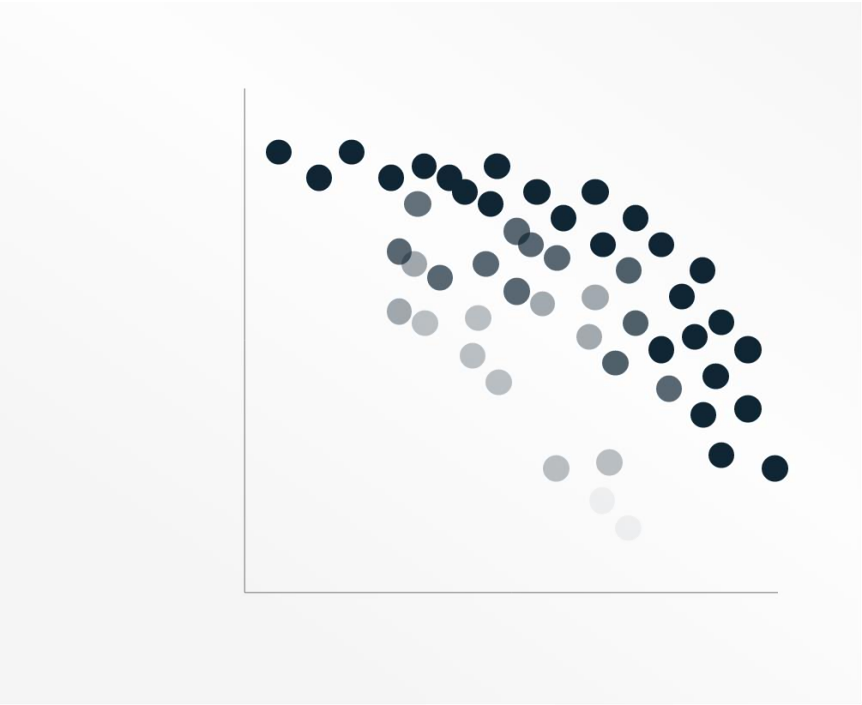
Why **SolasAI** Is Different

SolasAI goes beyond Data Science

We approach the problem from multiple sides, and which makes us a one-stop shop for fairer model reconstruction.

Competitors focus on one area of expertise, which leaves other important areas overlooked

Understand and Resolve Disparity while Preserving Predictive Value of Your Model



Detects and quantifies algorithmic disparities

Illuminate drivers of discrimination

Clarify drivers of predictive value

Auto-generate fairer alternatives

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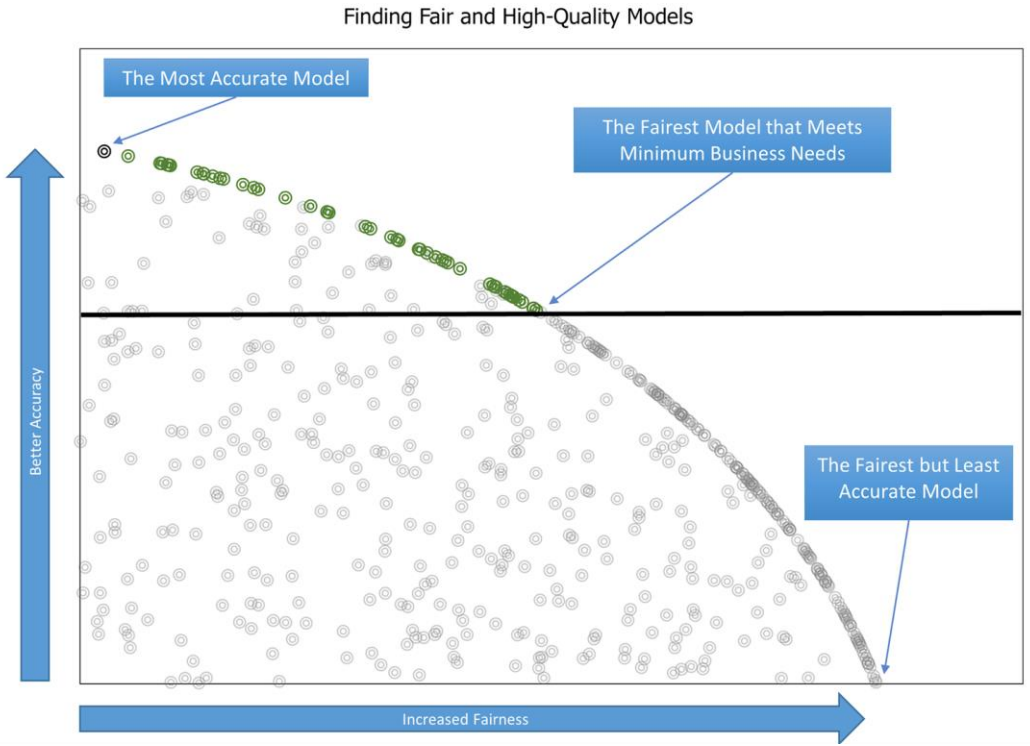
The **SolasAI** Software

Providing the best of both worlds: "The Pareto Frontier"



The best improvement in Disparate Impact for the minimum drop in accuracy

Looking for ***fair*** and ***predictive*** models is a "Multi-Dimensional Optimization Problem"

- are high quality, less discriminatory models along the Pareto Frontier

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How the **SolasAI** Platform Works

MODELER COMPLIANCE / LEGAL CHIEF DATA OFFICER

STEP
0

You are the best at building models for your company - We don't ask you to change

STEP
1

We take testing for disparity and alternatives off your plate so you can focus on generating good models for your company

STEP
2

We provide you additional insight to make your model better

STEP
3

We preserve and expand the great work you have done

STEP
4

We provide you the information you need to choose the best viable alternative for you business

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How the **SolasAI** Platform Works

MODELER COMPLIANCE / LEGAL CHIEF DATA OFFICER

STEP
0

You don't have to get your modelers to change

STEP
1

We test using accepted standards that will give you the greatest protection possible

STEP
2

We openly clarify what is happening in the models so you understand it

STEP
3

We generate justifiable alternatives that have a minor impact on predictive value

STEP
4

We provide you the information you need to choose the best alternative for your business and justify it to regulators

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How the **SolasAI** Platform Works

MODELER COMPLIANCE / LEGAL CHIEF DATA OFFICER

STEP
0

We aren't trying to replace your modelers

We just want to make them more efficient

STEP
1

We continually update our testing module based on the latest guidance, research and accepted standards

STEP
2

We illuminate what is driving value and disparities in your models

STEP
3

We generate viable alternatives that ensure overall model quality

STEP
4

We provide your subject matter experts the best alternatives and information to grow and protect your business

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You Use Your Tools and Your Expertise to Create the Best Predictive Model

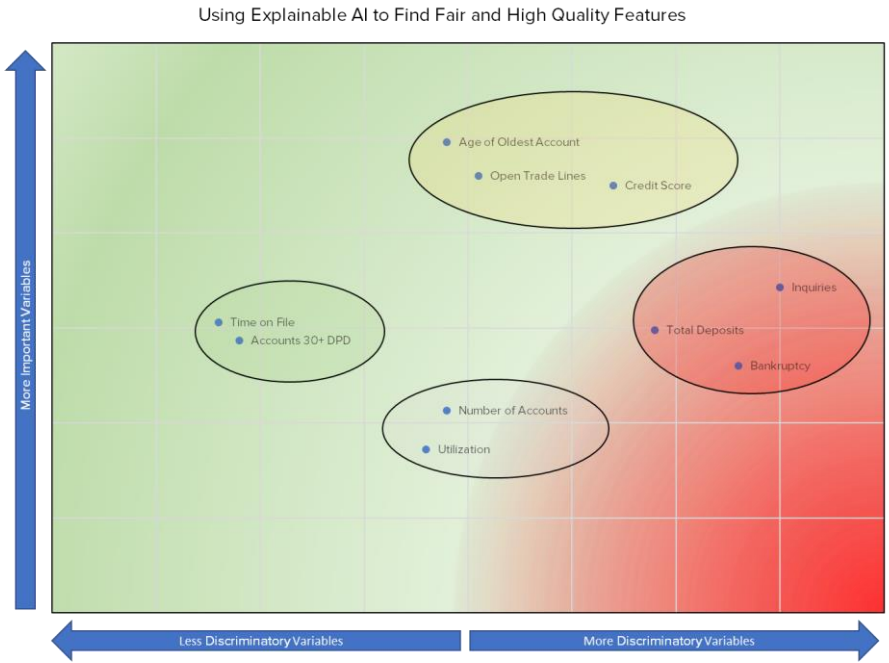
SolasAI – A highly flexible toolkit

1. Easily set model performance and fairness compliance standards
2. Can support virtually any supervised learning algorithm
3. Built in Python, but running with models built using other languages often requires little additional effort

SolasAI Tests for Disparities for You

1. Reports include standard measures - not metrics that do not have regulatory acceptance
2. Disparate impact (DI) measures that you will recognise -- including the Adverse Impact Ratio (AIR), Standardized Mean Difference (SMD), and Marginal Effects
3. Proxy analyses are based on traditional measures of statistical significance - but extended to machine learning

Use Explainable AI to Determine Drivers of Disparity and Model Quality



SolasAI measures the predictive importance of a feature as well as its impact on discrimination

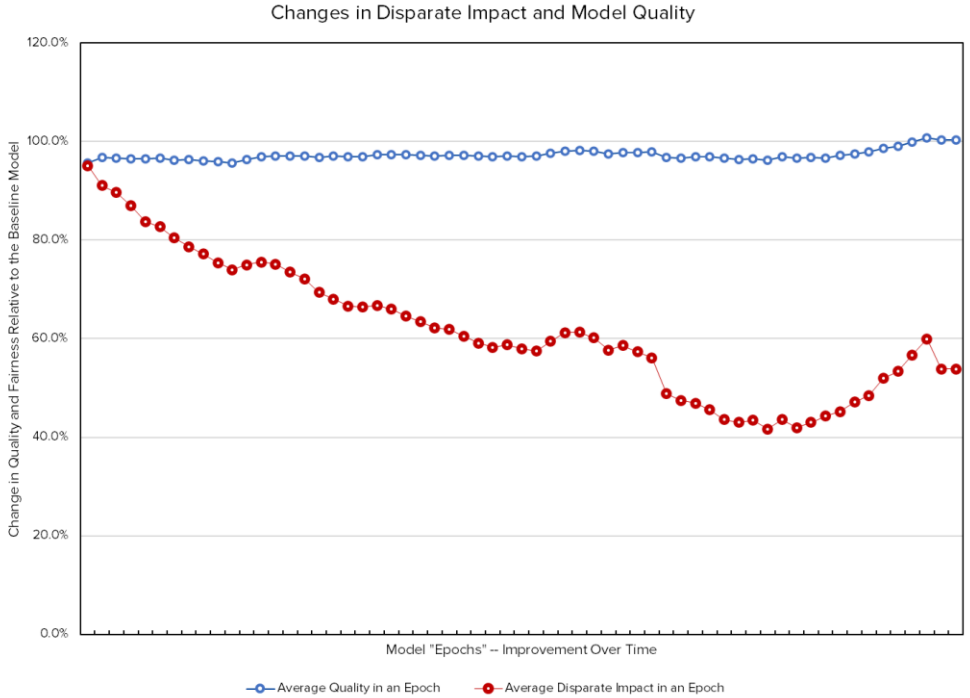
A feature's importance and fairness then informs the algorithm's search for alternative models

In SolasAI, Explainable AI:

1. Provides a guide for the algorithm to efficiently find the best possible models
2. Is used as reporting tool for modelers and compliance

Searches for High Quality, Low Disparate Impact Models

SolasAI succeeds in finding high-quality and fairer results *quickly*



Optimized search allows SolasAI to quickly find the best models

"Model Epochs" are a set number of models run simultaneously

Each epoch teaches the algorithm to learn fairer and higher quality models

Smart optimizations means that:

- Model quality improves over time
- Disparate impact decreases quickly and substantially

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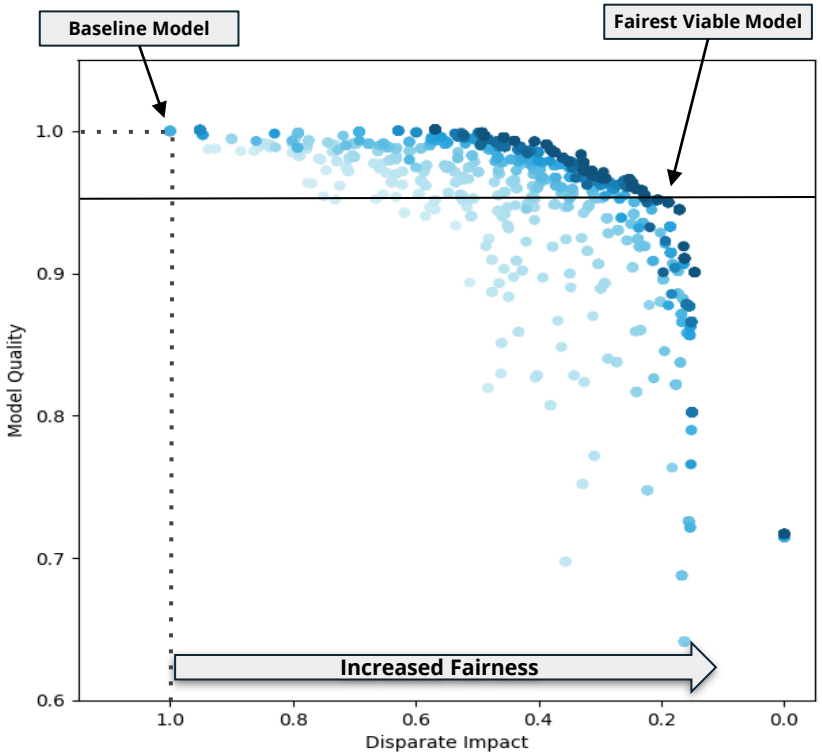
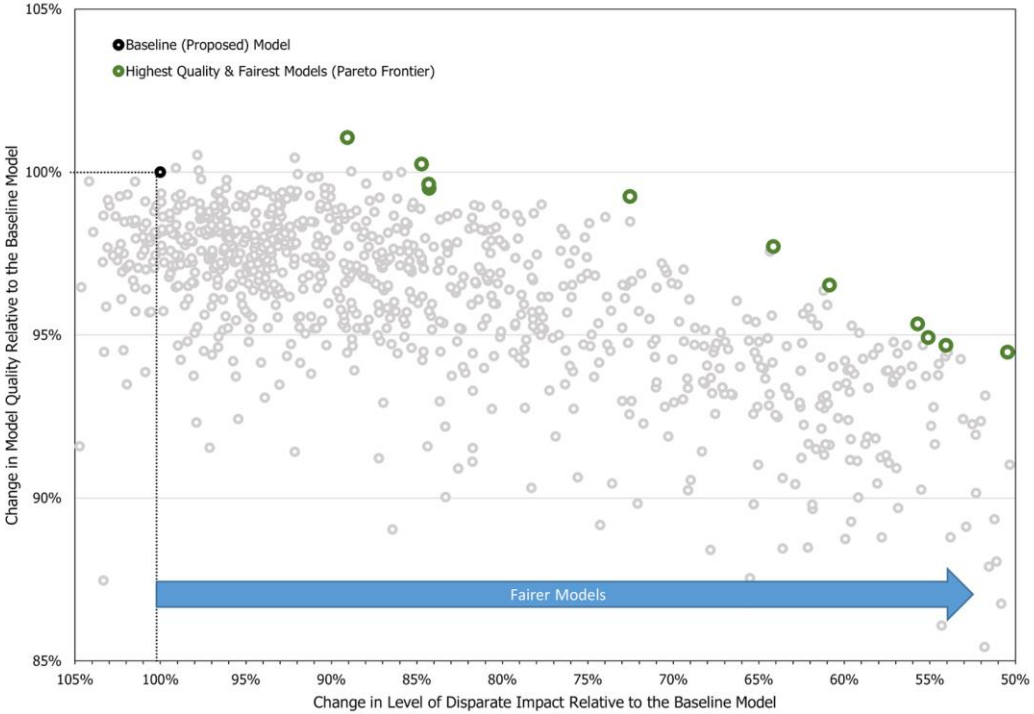
SolasAI searches for high quality, low disparate impact models



You Select the Final Model Based on Your Experience

SolasAI presents fairer alternative models for your experienced team to choose



SolasAI Results for an XGBoost Credit Model

SolasAI provides the user with a set of fairer models to analyze

The decision on which specific Alternative model(s) to use is a decision that is made by your experts

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SolasAI Software Modules

Module	Version	Definition
Disparate Impact and Bias Testing	V1.0	Calculate standard measures of disparate impact and differential validity for a variety of models or decision process outputs, along with measures of practical and statistical significance. Allows for the use of custom decision functions and custom DI metrics.
Explainable AI: Find the sources of disparities and quality	V1.0	Cutting-edge explainable AI techniques to identify which features (or collections of features) are most contributing to differences in group outcomes. Extends standard compliance testing (eg, analysis based on correlations) to the ML setting.
Optimized Alternative Model Search	V1.0	High-performance, dynamic, and Bayesian parallelized search of a universe of alternative models. Returns alternatives that have less disparity than the baseline model while maintaining accuracy.
Proxy Analysis: "Tree-follower" algorithm	V1.0	Tools that unpack the “black-box” of tree ensemble models. Identifies localized disparate treatment risk and features that serve as ‘proxies’ for demographic groups.
Proxy Analysis: Statistical significance for ML models	V1.5	Extends the current standard for testing the existence of proxy variables into the AI/ML realm. Based on the latest research in XAI and inference in the ML setting.
Tree Pruning Alternatives Search (patent pending)	V2.0	Novel method for creating fair and accurate alternatives for tree-based models. Explores “black-box” forest models and surgically removes the causes of disparate impact or treatment.

For More Information:

info@solas.ai