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Welcome to this session

Skills Bootcamp:

Q&A SESSION

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators answering questions.

Skills Bootcamp Data Science Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. We will be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

Skills Bootcamp Data Science Housekeeping

- For all **non-academic questions**, please submit a query: ***www.hyperiondev.com/support***
- **Report a safeguarding incident: *www.hyperiondev.com/safeguardreporting***
- We would love your feedback on lectures: ***Feedback on Lectures.***
- Find all the lecture **content** in your **Lecture Backpack** on GitHub.
- If you are hearing impaired, kindly use your computer's function through Google chrome to enable captions.

Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:

Ian Wyles
Designated Safeguarding Lead

Simone Botes

Nurhaan Snyman

Rafiq Manan

Ronald Munodawafa

Tevin Pitts

Scan to report a safeguarding concern

or email the Designated Safeguarding Lead:
Ian Wyles
safeguarding@hyperiondev.com

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Skills Bootcamp Progression Overview

✅ Criterion 1 - Initial Requirements

Specific achievements within the first two weeks of the program.

To meet this criterion, students need to, by no later than **01 December 2024 (C11)** or **22 December 2024 (C12):**

- **Guided Learning Hours** (GLH)**:** Attend a minimum of 7-8 GLH per week (lectures, workshops, or mentor calls) for a total minimum of **15 GLH**.
- **Task Completion:** Successfully complete the **first 4 of the assigned tasks**.

✅ Criterion 2 - Mid-Course Progress

Progress through the successful completion of tasks within the first half of the program.

To meet this criterion, students should, by no later than **12 January 2025 (C11)** or **02 February 2025 (C12):**

- **Guided Learning Hours** (GLH)**:** Complete at least **60 GLH**.
- **Task Completion :** Successfully complete the **first 13 of the assigned tasks**.

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Skills Bootcamp Progression Overview

✅ Criterion 3 – End-Course Progress

Showcasing students' progress nearing the completion of the course.

To meet this criterion, students should:

- **Guided Learning Hours** (GLH)**:** Complete the **total minimum required GLH,** by the **support end date.**
- **Task Completion : Complete all mandatory tasks**, including any necessary resubmissions, by the end of the bootcamp, **09 March 2025 (C11)** or **30 March 2025 (C12).**

✅ Criterion 4 - Employability

Demonstrating progress to find employment.

To meet this criterion, students should:

- **Record an Interview Invite:** Students are required to record proof of invitation to an interview by **30 March 2025 (C11)** or **04 May 2025 (C12)**.
  - **South Holland Students** are required to proof and interview by **17 March 2025.**
- **Record a Final Job Outcome :** Within 12 weeks post-graduation, students are required to record a job outcome.

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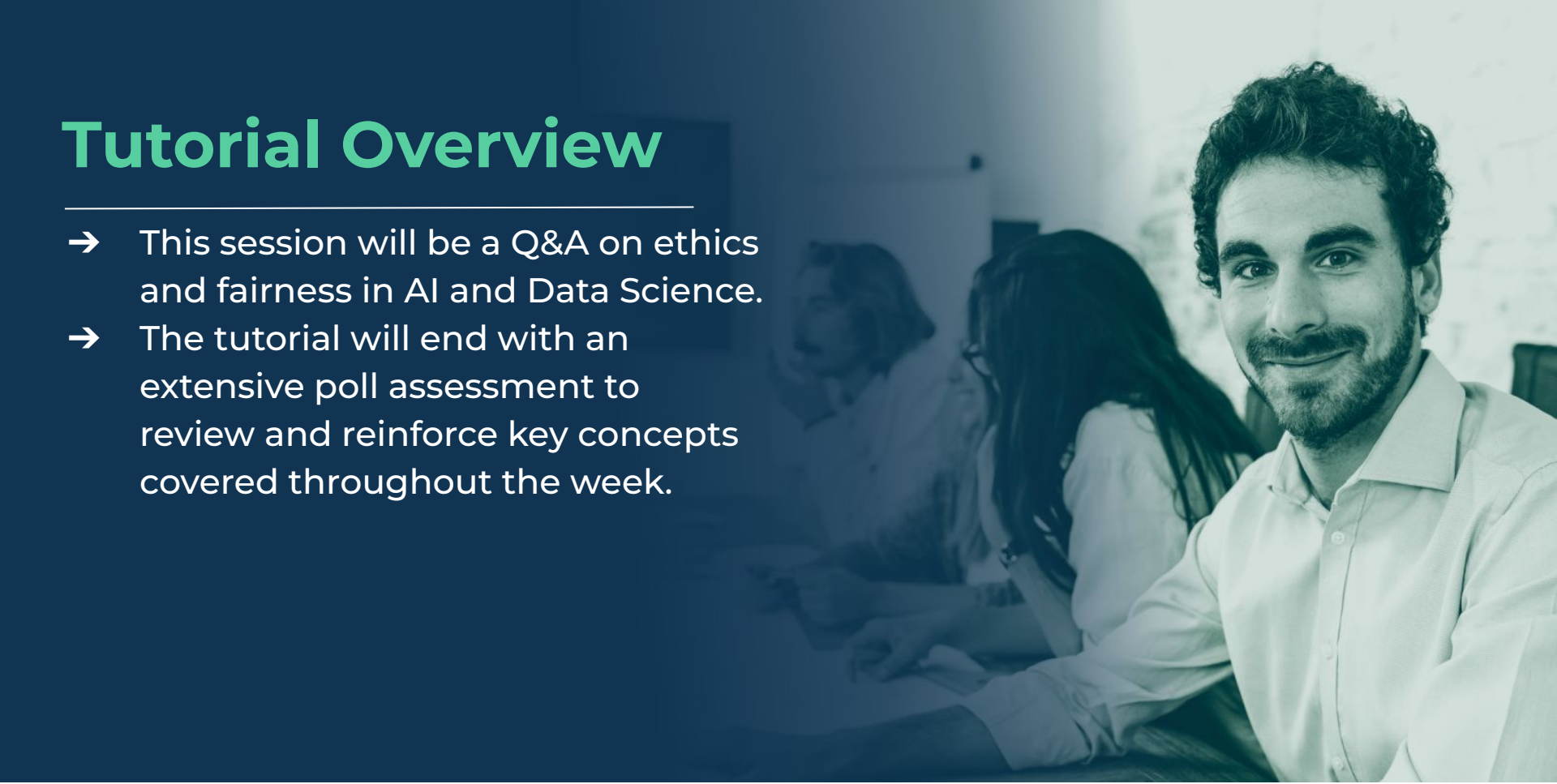
Learning Outcomes

- Identify discrimination in loan approval processes.
- Explain Fairness-Aware training and its role in bias mitigation.
- Ensure transparency in model decision-making using SHAP and LIME.
- Implement ethical AI documentation using Open Ethics Data Passport.

Tutorial Overview

- ➔ This session will be a Q&A on ethics and fairness in AI and Data Science.
- ➔ The tutorial will end with an extensive poll assessment to review and reinforce key concepts covered throughout the week.



Open Question

- What are some of the concepts covered throughout the week would you like us to revisit?

Image source: https://www.tpointtech.com/applications-of-machine-learning

Open Question

- AI systems are increasingly being used in critical areas like hiring, healthcare, and criminal justice. What ethical concerns do you think are the most important to address in AI development, and what questions do you have about ensuring fairness in these systems?

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Image source: https://www.tpointtech.com/applications-of-machine-learning

Fairness-Aware Loan Approval Model

Ensuring Ethical & Transparent Decision-Making in Credit Approvals

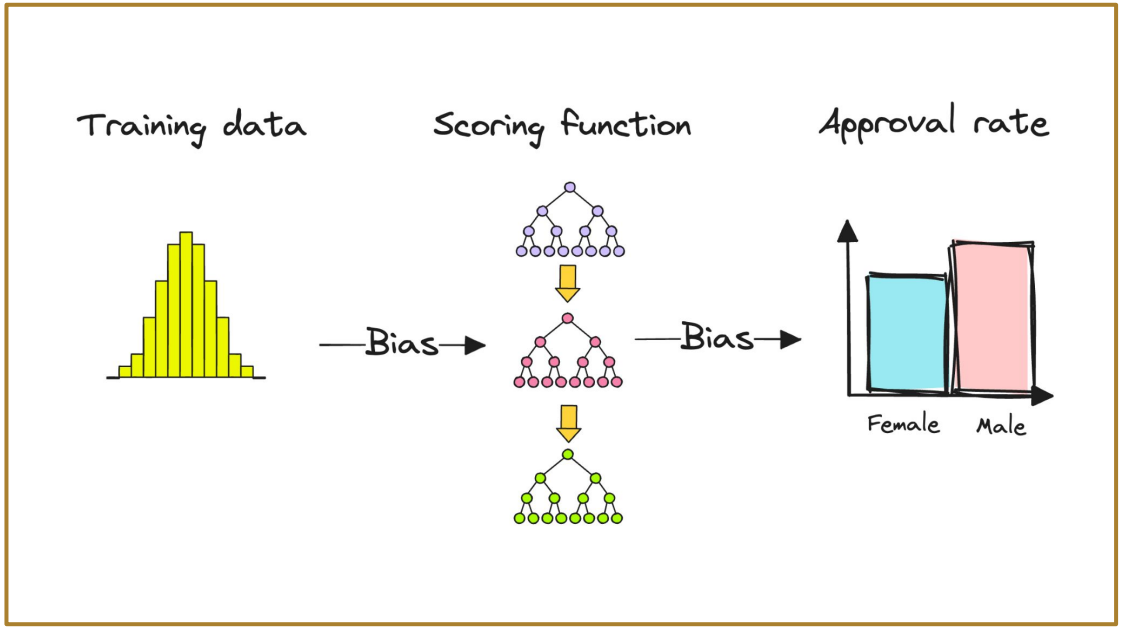
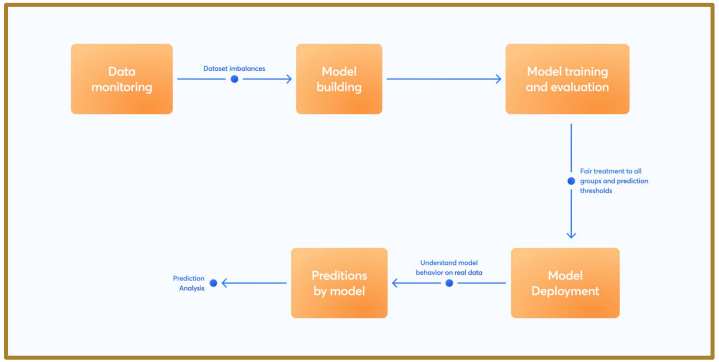


Image source: https://www.tpointtech.com/applications-of-machine-learning

What is this project about?

- Developing a loan approval model that ensures fairness across demographic groups.
- Utilizing Machine Learning while mitigating bias in predictions.
- Enhancing transparency using explainability techniques like SHAP & LIME.
- Documenting ethical considerations using Open Ethics Data Passport.



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Why is Fairness Important?

- Unfair loan approvals can reinforce systemic discrimination (e.g., gender, race, age).
- Regulatory frameworks (e.g., GDPR, Equal Credit Opportunity Act) emphasize non-discrimination.
- Building trust in AI-based decision systems.

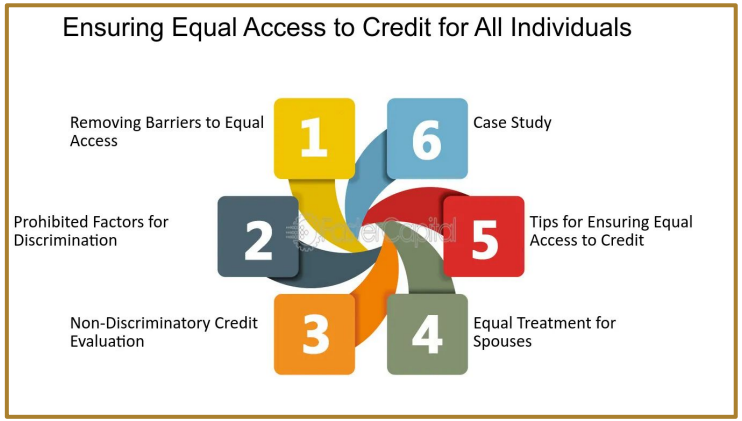

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Image source: https://www.tpointtech.com/applications-of-machine-learning

Requirements & Tools

- Dataset: UCI Credit Approval dataset
- Programming Language: Python
- Libraries Used:
  - scikit-learn, pandas, numpy (ML & data processing)
  - fairlearn (bias detection & mitigation)
  - shap, lime (explainability)
  - matplotlib, seaborn (visualization)

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Image source: https://www.tpointtech.com/applications-of-machine-learning

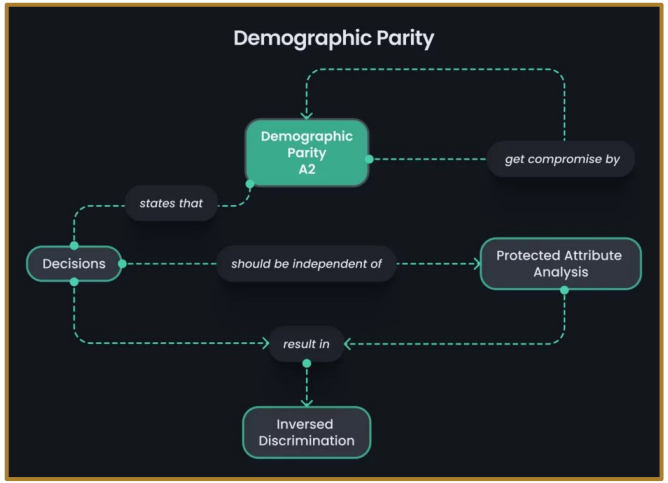
Methodology

- Load & Explore Data: Handle missing values & encode categorical features.
- Bias Detection: Analyze approval disparities across demographics.
- Train ML Models: Logistic Regression, Random Forest.
- Fairness-Aware Techniques: Apply reweighting, adversarial debiasing.
- Explainability: Use SHAP & LIME to interpret decisions.
- Ethical Documentation: Record fairness measures using Open Ethics Data Passport.

Image source: https://www.tpointtech.com/applications-of-machine-learning

Expected Outcomes

- A bias-mitigated loan approval ML model.
- Insights on fairness vs. accuracy trade-offs.
- Transparent decision-making with explainability tools.
- A documented ethical AI pipeline for responsible ML.



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Let’s Code!

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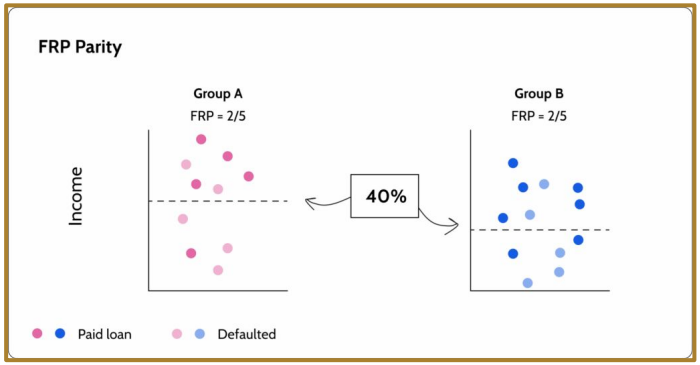
Next Steps

- Train with additional fairness metrics (Equal Opportunity, Predictive Parity).
- Deploy model via FastAPI/Flask.
- Build a Fairness Dashboard using Streamlit.



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Polls Assessment

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Which of the following is an indicator of bias in loan approval models?

A. Randomly rejecting applications
B. Different approval rates for different demographic groups
C. Approving all applications regardless of credit score
D. Rejecting applications with missing fields

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What is the main goal of Fairness-Aware training in machine learning models?

A. Increasing the accuracy of predictions
B. Ensuring equal treatment across demographic groups
C. Reducing the size of the dataset
D. Speeding up model training

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A. Data Augmentation
B. Adversarial Debiasing
C. Gradient Descent
D. Overfitting

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A. Fairlearn
B. SHAP
C. TensorFlow
D. OpenCV

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What is the purpose of using the Open Ethics Data Passport in ML projects?

A. To document ethical considerations and data sources
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D. To encrypt model outputs

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Which fairness metric measures whether individuals from different demographic groups have the same probability of a positive outcome?

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B. Mean Squared Error
C. ROC Curve
D. Feature Importance

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Questions and Answers

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Thank you for attending

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SKILLS FOR LIFE
SKILLS BOOTCAMPS

Department for Education