

HARNESSING AI & BEHAVIORAL SCIENCES TO TRANSFORM USPTO OPERATIONS

ORGB 671 | TALENT ANALYTICS

Final Presentation | Group Project

Group 3

Josh | Keani | Meriem | Niki | Sheida

AGENDA

- 1 PROJECT OVERVIEW
- 2 ANALYTICAL METHODOLOGY
- 3 INSIGHTS SHARING
- 4 PEOPLE ANALYTICS SOLUTIONS - IMOCHA
- 5 RECOMMENDATIONS & KEY CONSIDERATIONS
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PROJECT OVERVIEW & OBJECTIVES

An Innovative Approach to Patent Analytics

Our project combines AI with behavioral sciences to streamline the USPTO's patent examination, targeting a system that is both equitable and effective. By utilizing state-of-the-art technology and insights from scientific studies, we aim to improve the patent process's transparency and foster innovation, strengthening the infrastructure that supports our innovation ecosystem. Our goal is to offer actionable recommendations and leverage OpenAI technologies, aiming for a more efficient and equitable patent process.

PROJECT GOALS

- Primary Objectives
 - Understanding Social Impacts: Examine how gender, race, and ethnicity influence patent review times and examiner attrition rates.
 - Analytical Tool Assessment: Effectiveness of current analytics tools in identifying and mitigating biases within patent processes.
 - Data-Driven Insights: Comprehensive data analysis to offer actionable insights for policy and process improvements.
- Anticipated Outcomes:
 - Enhanced fairness and efficiency in patent reviews.
 - Informed recommendations for integrating AI and behavioral insights into the USPTO's operational framework.

PROBLEM STATEMENT

Addressing Systemic Issues:

- Analysis of USPTO data to understand the influence of gender, race, and ethnicity on patent review times and examiner turnover.
- Two-Part Analysis:
 - Detailed study on patent processing times and turnover.
 - Evaluation of current analytics tools, focusing on AI and behavioral science innovations.

DATA SOURCES & METHODOLOGY

STRATEGIC METHODOLOGY: ENRICHING USPTO DATA ANALYSIS WITH ADVANCED TECHNIQUE

- **Methodological Framework:**

- Data Collection: Systematic extraction of relevant data points, including applicant demographics and patent examination details.
- Preprocessing: Cleaning and structuring data for analysis, ensuring accuracy and reliability.
- Analytical Approach: Application of statistical models and machine learning techniques to identify key factors influencing patent review outcomes and examiner attrition.

- **Main Goal:** To derive insights that inform policy recommendations and tool development for optimizing patent examination processes.

USPTO Dataset Overview

- **Comprehensive USPTO patent application data, highlighting its critical role in patent analytics.**

- **Significance:** Enables analysis of patterns and trends affecting patent review times and examiner behavior.

Brief Outlook on Our Core Analytical Findings

- *Quantitative Insights on Examiner Influence through logistic regression*
- *Attrition pattern identification, i.e., indirect signals of examiner attrition*
- *Disparities in prosecution length, i.e., prosecution lengths across different demographics*
- *Key predictors of patent outcomes, i.e., predictors affecting review times and attrition rates.*

Final Project - USPTO Examination Analysis

2024-02-09

Introduction

This analysis aims to explore organizational and social factors affecting the length of patent application prosecution and examiner attrition at the U.S. Patent and Trademark Office (USPTO), with a particular focus on the role of gender, race, and ethnicity.

Data Loading

First, we need to load the dataset.

```
# Read the dataset
applications <- 
read.csv("/Users/sheidamajidi/Desktop/Winter2024/COURSES/ORGB671/Final
Project/app_data_starter.csv")
applications

##   application_number filing_date examiner_name_last examiner_name_first
## 1             8284457 2000-01-26      HOWARD        JACQUELINE
## 2             8413193 2000-10-11     YILDIRIM        BEKIR
## 3             8531853 2000-05-17    HAMILTON       CYNTHIA
## 4             8637752 2001-07-20      MOSHER        MARY
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Code Snippets

(Screenshots of code sections will be inserted here)

Brief Outlook on

Showcasing:

- Data preprocessing and cleaning methods.
- Application of logistic regression models.
- Implementation of machine learning algorithms for predictive analysis.

the critical role in patent analytics.

- *Significance: Enables analysis of patterns and trends affecting patent review times and examiner behavior.*

of examiner attrition

- *Disparities in prosecution length, i.e., prosecution lengths across different demographics*
- *Key predictors of patent outcomes, i.e., predictors affecting review times and attrition rates.*

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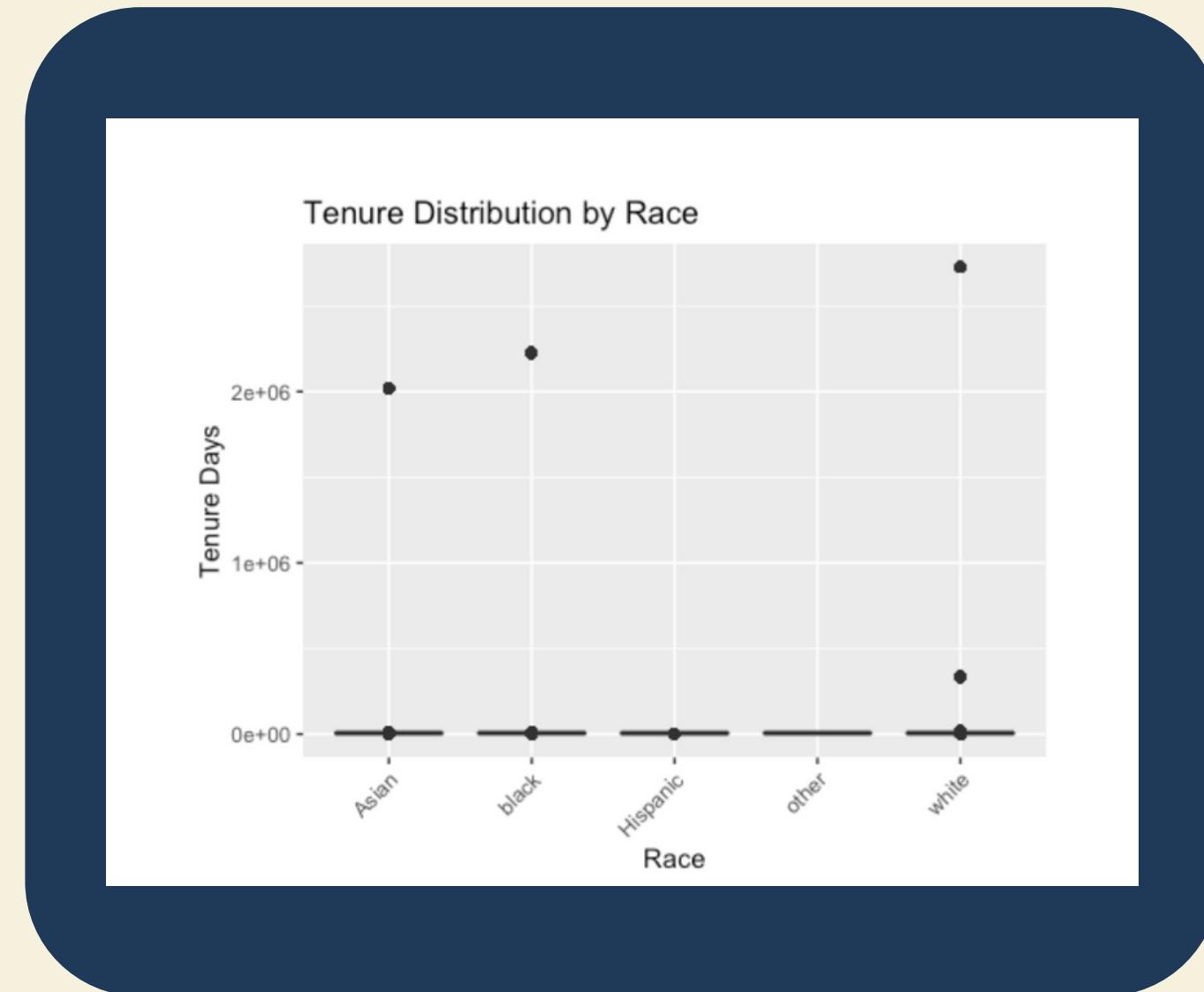
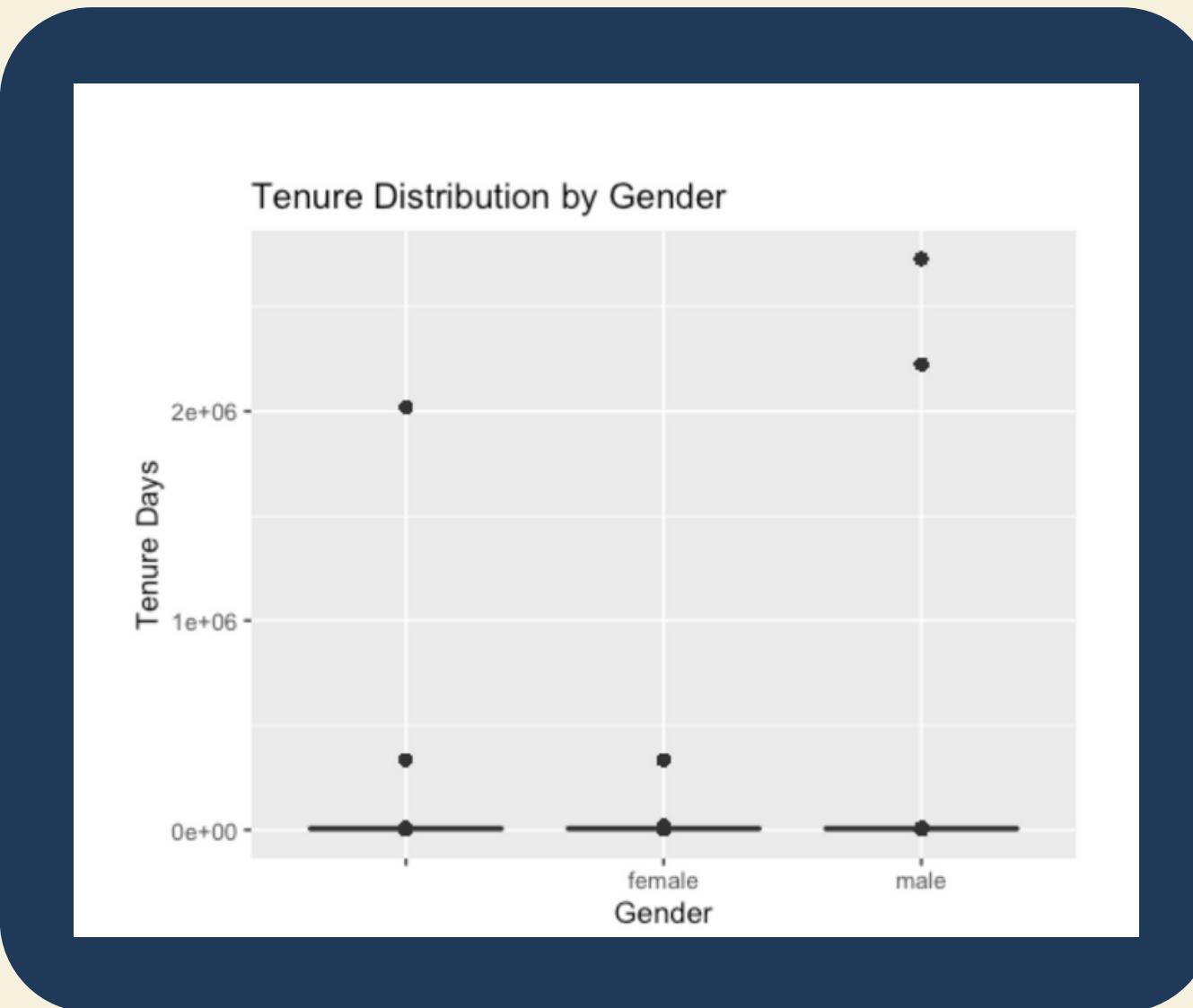
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PART 1: ANALYTICAL INSIGHTS

TENURE DISTRIBUTIONS

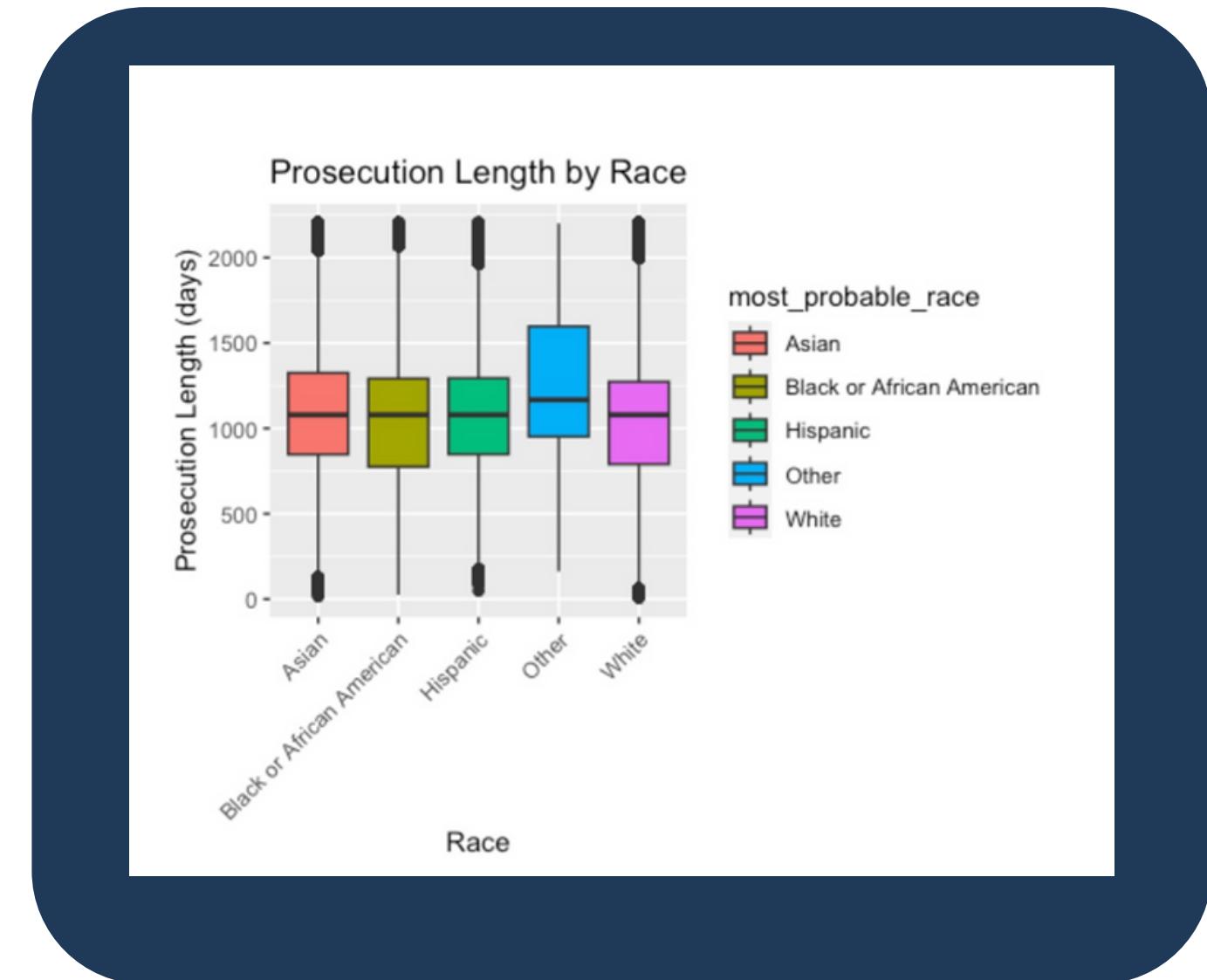


Significant Predictors Identified:

- Logistic regression and machine learning models unveiled key variables influencing patent review times and attrition rates, such as 'raceblack' and 'gender.xfemale', indicating systematic disparities.
- 'Tenure_days' emerged as a significant predictor, showing a decrease in the likelihood of certain outcomes (e.g., application approval or examiner attrition) as tenure increases.

PART 1: ANALYTICAL INSIGHTS

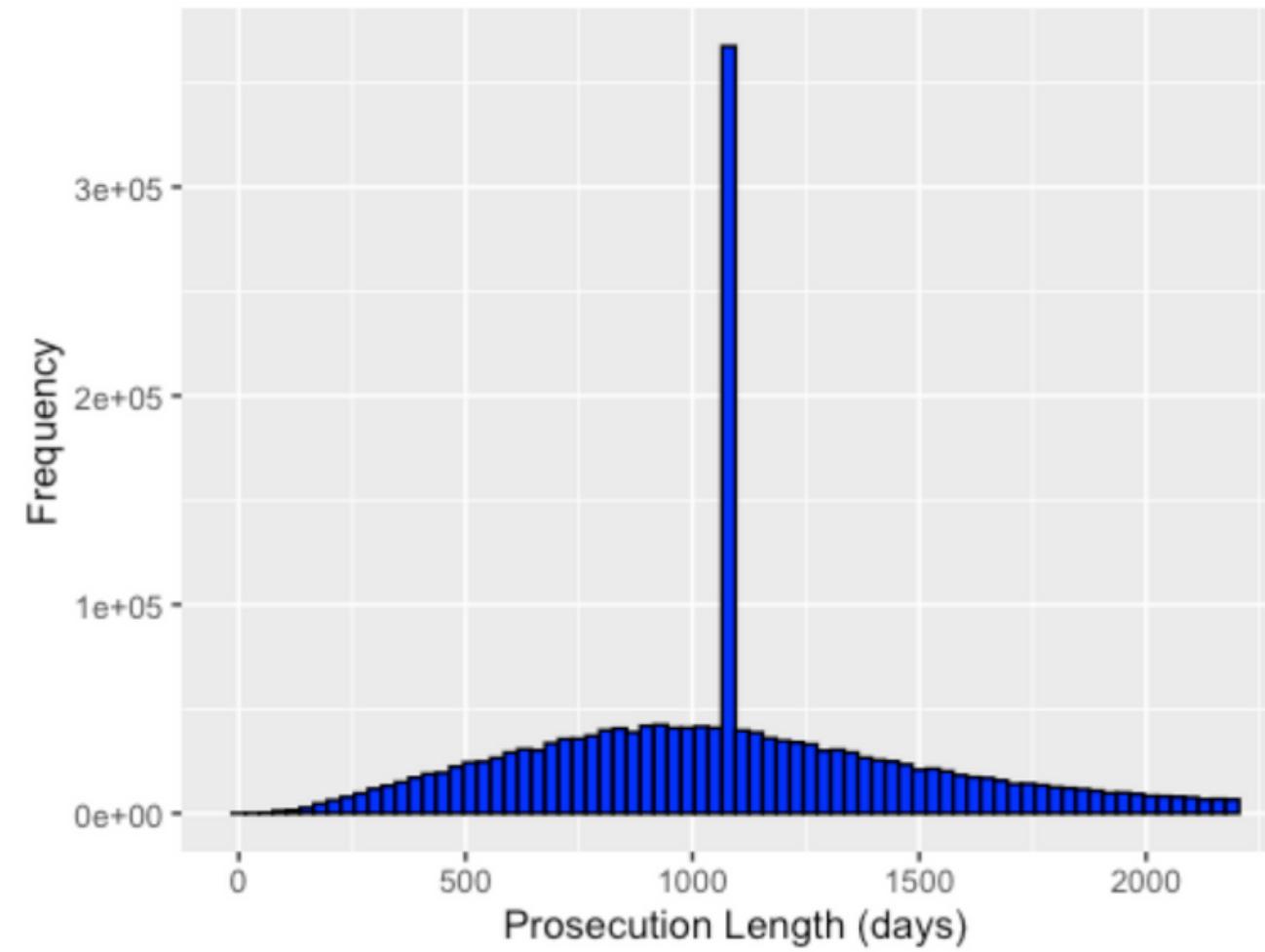
PROSECUTION LENGTHS



Visualizing Disparities:

- Box plots for prosecution length by gender and race provided visual evidence of variations, with male examiners showing slightly higher median prosecution lengths and notable disparities within racial categories.

Distribution of Prosecution Lengths



Enhancing USPTO Efficiency through iMocha's Talent Management Solution

- Objective: Explore organizational and social factors affecting patent application prosecution and examiner attrition
- Focus on gender, race, and ethnicity roles

- The histogram displays a right-skewed distribution with most prosecutions concluding swiftly, typically within 500 days.
- A pronounced peak near the beginning shows a high frequency of cases with short prosecution lengths.
- The frequency diminishes as prosecution length increases, highlighting fewer long-duration cases.
- This pattern suggests efficient processing for most cases, with a few extending beyond the norm, meriting further review for case management optimization.

PART 2: PEOPLE ANALYTICS SOLUTIONS

INTRODUCTION TO IMOCHA'S AI-POWERED SKILLS INTELLIGENCE CLOUD

- iMocha leads in revolutionizing talent management with its AI-powered platform, fostering a skills-first approach.
- Offers a comprehensive skills inventory, multi-channel skills validation, and AI-driven insights for workforce planning and development.

Leveraging iMocha for the USPTO:

- Identifies skill gaps within each art unit, customizing learning paths for examiners.
- Aims to address disparities and biases, ensuring fair and equitable patent examination processes.

Current Challenges at USPTO

- Skill gaps in different art units.
- Disparities in patent issuance performance across gender and ethnic groups.
- Importance of diversity and inclusion training



Benefits	Potential Concerns
<ul style="list-style-type: none">• Customized skills development paths based on examiners' needs.• Objective distribution of patent work leveraging skill-based assessments.• Potential to enhance operational efficiency and address disparities in patent issuance.	<ul style="list-style-type: none">• Construct validity issues with skills validation and learning path recommendations.• Effectiveness of personalized development paths dependent on algorithm accuracy.• Ethical considerations regarding biases in skill assessments and recommendations.

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Leveraging iMocha for the USPTO:



AI-powered digital
skills assessment

- Disparities in patent issuance performance across gender and ethnic groups.
- Importance of diversity and inclusion training



- Based on examiner reviews and AI analysis.
- Objective distribution of skills leveraged skill-based learning.
- Potential to enhance operational efficiency and address disparities in patent issuance.

- Revolutionizing talent management, acquisition, and development.
- AI-powered platform fostering a skills-first approach.
- Contains a customized skills inventory for each employee.
- Extensive library of over 2,500 skill sets.
- Multi-channel skills validation for strategic workforce planning.
- Empowers organizations to adapt to changing workforce demands.

- Ethical considerations regarding biases in skill assessments and recommendations.

PART 2: PEOPLE ANALYTICS SOLUTIONS

FUTURE DIRECTIONS & CONSIDERATIONS

Future directions emphasize the necessity of validating skills assessments and personalized development paths in talent management systems. Ensuring algorithm accuracy and aligning learning interventions with individual career goals are crucial.

Construct Validity Concerns and Effectiveness of Personalized Development Paths

- Reliance on skills validation and assessment.
- Importance of rigorous validation studies.
- Risk of misinterpreting data without validation.
- Accuracy of algorithms and data crucial.
- Consideration of individual learning styles and career aspirations.
- Aligning paths with effective developmental interventions.



AI-powered digital
skills assessment

Evaluating iMocha's Solution

- Any interpretation of data has to account for context
- Factors like test anxiety or unfamiliarity can influence performance on skills assessments
- Biases in training data can lead to inaccurate predictions, and assumptions may not hold true across different organizational contexts or as job roles evolve
- Data or algorithmic biases can unintentionally exacerbate disparities within an organization

PROJECT RECAP & CONCLUDING THOUGHTS

talent management systems. Ensuring algorithm accuracy and aligning learning interventions with individual career goals are crucial.

- While iMocha's talent management solution offers promising tools, evaluating them requires considering research design and evidence quality
 - Reliance on skills validation and assessment.
 - Importance of rigorous validation studies.
- Ensuring effectiveness and fairness demands ongoing validation studies, robust data handling practices, and an awareness of predictive analytics limitations
- Consideration of individual learning styles and career aspirations.
- Aligning growth with effective developmental interventions
- The USPTO can leverage iMocha's talent management software to eliminate gender, racial, and ethnic biases, and shorten application prosecution time
- If implemented correctly, it can help them promote and equitable and efficient work environment where employees can grow and feel valued
 - Factors like test anxiety or unfamiliarity can influence performance on skills assessments
 - Biases in training data can lead to inaccurate predictions, and assumptions may not hold true across different organizational contexts or as job roles evolve
 - Data or algorithmic biases can unintentionally exacerbate disparities within an organization

**THANK YOU FOR YOUR
ATTENTION!**

Q&A

GROUP 3

PART 1: EMPIRICAL ANALYSIS

UNVEILING DISPARITIES: A DATA-DRIVEN EXAMINATION OF USPTO DYNAMICS

Impact of Demographics on Patent Processing: Our study's empirical analysis uncovers significant disparities in patent processing times and outcomes, influenced by examiner demographics like gender and race. These disparities indicate potential biases or systemic issues, impacting fairness and equity in the patent system. Highlighting the need to address how social dynamics affect organizational processes, our findings urge a reevaluation of practices and the adoption of strategies to reduce biases. This calls for USPTO reforms to improve diversity, inclusion, and efficiency, possibly by integrating AI and machine learning tools to counteract human biases.

Key Findings

- Gender, race, and ethnicity significantly influence patent processing times and examiner attrition rates.
- Disparities in prosecution length observed across different examiner demographics, with potential implications for USPTO operational efficiency and fairness.
- Statistical analyses reveal significant predictors of review times and attrition rates, suggesting areas for policy and process improvement.



Insights for Improvement

- The empirical analysis highlights the need for targeted interventions to address disparities and biases in the patent examination process.
- Recommendations for USPTO include enhancing diversity and inclusion initiatives, standardizing processes to minimize individual biases, and leveraging AI tools for more objective decision-making.

Future Directions

- Further research suggested to explore the root causes of observed disparities.
- Continuous monitoring and evaluation of implemented changes to ensure ongoing improvement in USPTO operations.

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Leveraging iMocha for the USPTO:



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Current challenges:

- Disparities in patent issuance performance across gender and ethnic groups.
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→ based on examiners'

- Objective distribution leveraging skill-base

- Potential to enhance operational efficiency and address disparities in patent issuance.

Customized Learning Paths with iMocha

- Identifying skill gaps with iMocha's skills assessment tool
- Customizing learning paths for examiners in different art units
- Promoting continuous learning and growth opportunities

Enhancing Examiner Expertise

- Personalized development paths tailored to examiner tenure and role
- Foundational training for newer examiners; advanced courses for experienced ones
- Addressing disparities in patent issuance through insights gained from iMocha's platform

- Ethical considerations regarding biases in skill assessments and recommendations.