DEVELOPING A RECOMMENDATION SYSTEM FOR COLLEGIATE GOLF RECRUITING

THE IMPACTS OF USING AI-BACKED APPLICANT TRACKING SYSTEMS FOR RECRUITMENTS PROCESSES

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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I. Introduction

In the second half of the 20th century, many companies and organizations began to actively document and record their business processes in an effort to better comprehend the state of their businesses, ushering in a new age of data collection and analysis (Davenport, 2013, p. 67). At its inception, data analysis was reserved for organizations that possessed the infrastructure and manpower to collect and meaningfully process large quantities of data. Today, however, "it's every firm in every industry. If your company makes things, moves things, consumes things, or works with customers, you have increasing amounts of data on those activities." (Davenport, 2013, p. 67) A notable application in the realm of data analytics is its increasing importance in sports. The creators of GameForge, an online service golfers can use to assess their current game as well as receive artificial intelligence (AI) recommended drills, are looking to expand their current platform to aid college golf coaches in the recruiting process. The technical project, sponsored by GameForge, will analyze round data for junior, college and professional golfers in order to create a model that will help coaches gain insight on which junior golfers will be the best fit and have the highest potential for improving their team.

Recommendations by AI have also become commonplace within the recruiting protocols of numerous human resource departments. In the years before the ubiquitous use of the internet, candidates applied to jobs through newspapers, professional connections and referrals, or resume drops. Applying to jobs today is dramatically different, requiring little to no human interaction, and is facilitated primarily through the internet. The increased ease of applying to jobs has led to larger applicant pools for recruiters; therefore, in an attempt to identify qualified candidates that best match the needs of a position, many companies have turned to applicant tracking systems (ATS) to filter the applicant pool to a manageable size (Black & van Esch, 2020, p. 216). While

the benefits of using ATS are clearly substantial, namely the reduction in time needed to filter the great applicants from the average in an application pool, what are the consequences of allowing AI to make these key decisions? The STS Project will not only provide a thorough overview of the now commonplace use of ATS within the hiring space, but also explore the potential for and remedies of discrimination within these algorithms.

II. Technical Topic

In the last few decades the field of sports analytics has grown from an antiquated system, using personal experience and popular opinion to determine desirable players into a cutting edge field that is using big data to drive decisions (Steinberg, 2015). It is no longer enough to just be a winning team. Coaches want to know why they are winning, what makes their players successful and how they can continue to be successful as their players come and go. The field has so expanded that, "Today, every major professional sports team either has an analytics department or an analytics expert on staff." (Steinberg, 2015, para. 3) College golf is no exception to this paradigm shift to using analytics to characterize and improve player performance, but their recruiting practices continue to rely heavily on public rankings and coaches collecting player information themselves by attending tournaments and making connections. In an effort to streamline the recruiting process for all college golf teams, the technical project team will work with the founders of GameForge to model data from college golf teams, the American Junior Golf Association (AJGA), and GameForge to determine a method of matching players and teams that can be applied to a recommender system.

The team first approached the task by distilling conversations with collegiate golf experts along with information collected from student golfers into a set of objectives the future recommendation system would need to meet. The following objective tree details the goals of the

system with the main objective of matching junior golfers with college teams based on best fit for the golfer and the coach.

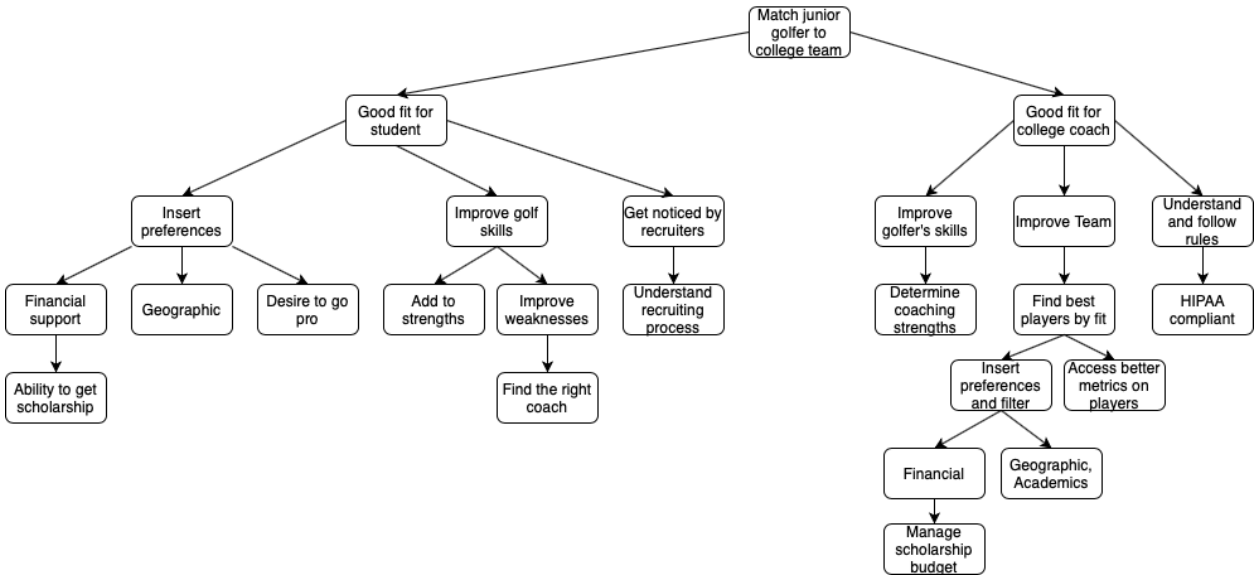

Figure 1: Objective Tree of GameForge Recommendation System: A depiction of the various objectives possessed by both college coaches and junior golfers. (Barnard, et al., 2020).

To meet the objectives set above, the team will analyze hole data from junior players in the AJGA, from college teams, and from professional players. There are four areas the team has decided to explore and potentially model. A "lookalike" model will allow coaches to find junior players whose mean and variance scores most closely match a certain player, allowing coaches to try to mimic desirable players or replace graduating team members without dramatically impacting the team distribution. Another model will analyze the individual players impact on team scoring to find the optimal breakdown of team members, thus determining whether a team would benefit more from a player with a good shooting average and low variance or a player with a higher variance. A player success model will analyze player performance on holes of different par values, yardages and difficulty to determine the most qualified players. Finally, the team will explore the possibility of an improvement model which would aid in matching players to specific coaches by identifying the "types" of golfers coaches have had the most success in

improving while on their team. The following figure provides a graphical explanation of how the data-driven models made by the team will be able to integrate with profile data of GameForge users to offer matching recommendations.

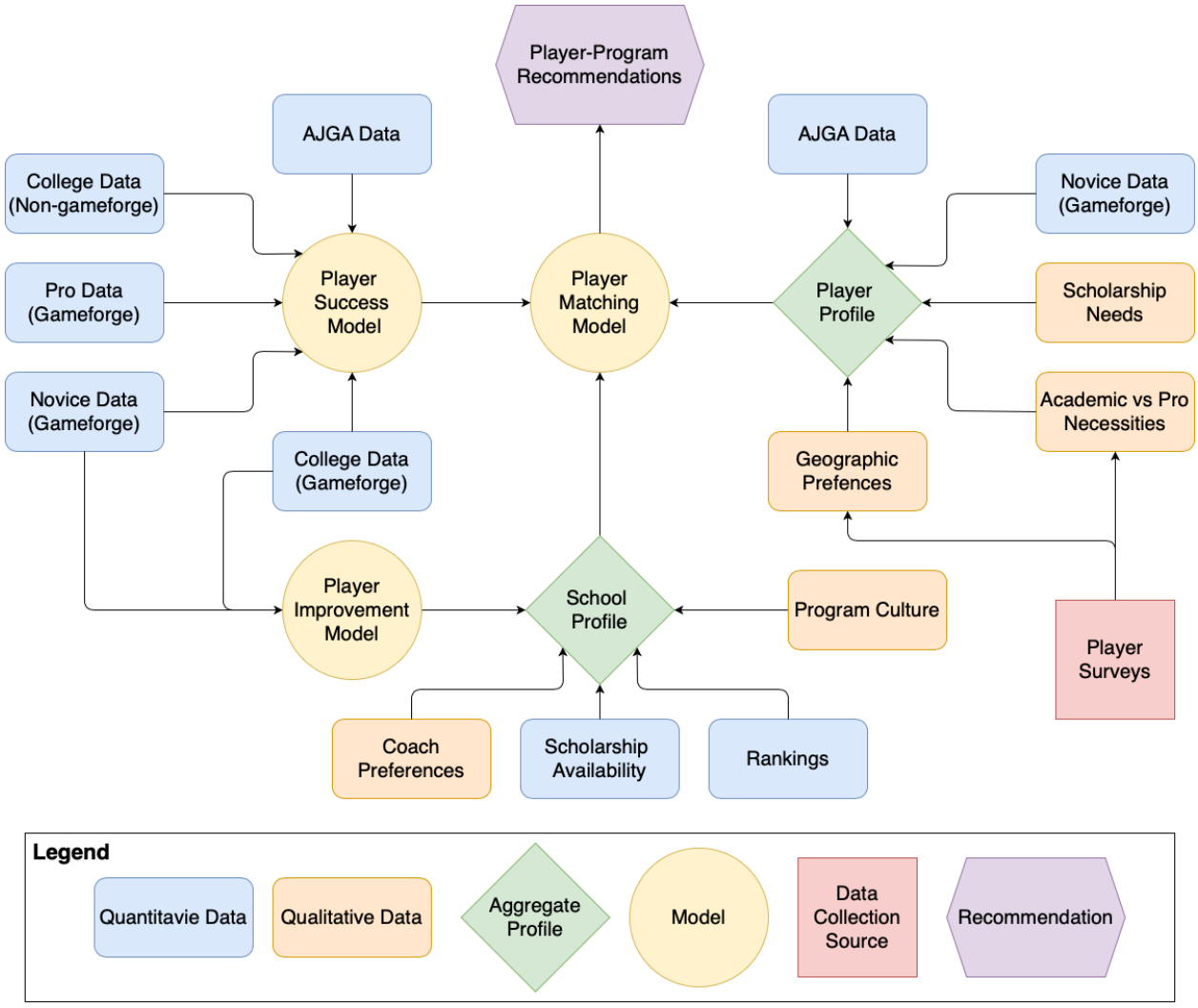

Figure 2: Flow Diagram of Relevant Models and Data: A depiction of the various models to be used within the GameForge recommendation system. (Barnard, et al., 2020).

In order to generate the best matches, it is the team's recommendation that GameForge also include qualitative data such as a player's preference for warm or cold weather, scholarship need and academic abilities to ensure coaches are matching with students that fit within their programs. The resulting recommendation system's benefits will be twofold: first, it will help

junior players gain the attention of coaches, and second it will help coaches identify which junior players to focus their recruiting efforts on, greatly decreasing the time intensity of recruitment.

III. STS Topic

A culmination of technological developments starting in the late 1990s, have catapulted the business processes of human resource departments from analog to high-tech, and completely reshaped the recruiting process (Black & van Esch, 2020). Using artificial intelligence to power applicant tracking systems, companies have been able to reduce both the time and costs associated with recruiting, making the adoption of ATS essential for a prospering business (Laumer, Maier, & Eckhardt, 2015). Concern, however, exists regarding the possibility for unintended bias to exist within applicant tracking systems and subsequently a company's personnel. In a 2015 progress report, the White House notes that, "there also exists the potential for big data technology to be used to discriminate against individuals, whether intentionally or inadvertently, potentially enabling discriminating outcomes, reducing opportunities and choices available to them." (Executive Office of the President, 2015) As a result, the STS research topic of this report will explore the impacts of using artificial intelligence in the form of applicant tracking systems within the recruitment process.

The topic will be analyzed using the theory of Social Construction of Technology to show how human action affects technology, specifically examining the interpretive flexibility and relevant social groups of ATS. Relevant social groups include the hiring managers, job applicants, software developers, company values and the applicant tracking system itself. In 2019, 99% of Fortune 500 companies used an applicant tracking system to manage their talent acquisition, making the use of ATS a pervasive solution for companies searching for human capital (Qu, 2019, para. 5). Considering the prevalence of applicant tracking systems in today's

hiring processes and their expected market growth despite the relative "newness" of artificial intelligence and machine learning technology, it is feasible to assume that use of applicant tracking systems will continue to grow and impact the job acquisition (Markets and Markets, 2018, para. 1). It is clear that ATS are influential in the hiring process. Therefore, any biases present in applicant tracking systems, whether by intentional programming or unintentional, implicit bias, have the potential to critically heighten the presence of bias or discrimination within an applicant pool and eventually a company.

It is important to first note how these systems track and classify applicants in order to identify shortcomings and areas that can be manipulated. Previous iterations of applicant tracking systems simply scanned resumes, looking for keywords that matched the desired skills for a certain position. Current applicant tracking systems, however, contain many levels of filtration. The ATS reads in resume data and separates experiences into different categories, such as experience and education. The system then matches the newly read in data to keywords set by a recruiter for the position in question and finally scores applicants based on their aptitude for the position and company (Savage & Bales, 2017). An estimated 75% of resumes never make it past the applicant tracking system and into the hands of a recruiter, making the use of ATS a significant barrier to entry for candidates whose resumes are not chosen (Bell, 2018). The first hurdle for applicants is having their experiences recognized as significant by the system which can be inhibited by unique formatting, wording or font choice. Next is being considered a "good fit" for the role. Many companies do not score candidates solely on the presence of desirable words in their resume but rather by using predictive analytics to classify candidates based on certain attributes which the company will then use to support their decisions in identifying the candidates with the potential to be most successful (Sammy, 2019).

There does not exist an objective set of traits, experiences or skills that can indicate or predict superior job performance. Therefore, all algorithms used to identify superior candidates are based on opinion or precedent, and biases, whether outright or implicit, present in the organization can become exacerbated (Howard & Borenstein, 2018). This indicates that the technology itself does not determine who will be considered a desirable candidate, but rather humans designing and influencing the system will. Consequently, the interpretations of this technology are flexible. Companies who are gaining valuable human capitol despite a reduction in workload and costs will have a greater opinion of ATS when compared to applicants who feel they are not being recognized by the system.

For example, the lack of diversity present within major tech companies in Silicon Valley has long been questioned and is frequently met with the argument that these companies are hiring for "cultural fit" (Barton, 2019, para. 9-13). This lack of diversity, however, could be explained by algorithmic bias. Research from a 2017 American Bar Association journal explains, "Algorithm creators rely on employers' past hiring data to build predictive formulas to match their best workers' traits with job applicants' data. If a company has not historically hired people from a particular racial or ethnic group, its algorithm will systematically exclude such people from consideration" (Savage & Bales, 2017, p. 224).

Both the benefits and shortcomings of implementing applicant tracking systems will be further explored in the STS research paper using case studies and historical instances as data. The research paper will also explore current tactics for removing and avoiding potential influencers of bias within recruiting algorithms. The study will conclude with a determination of the feasibility of generating an applicant tracking system void of bias.

IV. Timeline and Expected Outcomes

The technical project will create models to act as predictors for junior golfers success within the college sport for GameForge in order to craft a recommender system that will aim to connect junior golfers and college coaches. The matching process provided by this system will aid coaches in determining which golfers would be the best suited for their teams, giving coaches more time to devote to recruiting these individuals. The project will be documented in a cumulative report to be presented at the Systems and Information Engineering Design Symposium (SIEDS).

The STS research paper will explain the use of applicant tracking systems in recruiting practices as well as explain their potential susceptibility to bias. A successful thesis project would be informational for both job applicants and hiring companies on the topic of bias and discrimination within hiring technology and offer potential solutions and abatements.

Both the technical project and STS research project will be finished in the Spring of 2021.

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