Thesis Portfolio

Developing State-Based Recommendation Systems for Golf Training

(Technical Report)

Distance Gains and Growing Pains: Addressing Distance Proliferation on the PGA TOUR

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Golf, a sport long steeped in elitist tradition and stodgy social values, is undergoing sweeping changes challenging this antiquated reputation. This portfolio considers two of these phenomena. First, like many other sports, golf is embracing the ever-expanding capabilities of data-driven decision making. The Capstone Project portion of this portfolio focuses on the efforts of Gameforge Golf, an up-and-coming force in the golf data industry, to create a data-driven model capable of empirically recommending practice routines for elite players. Second, the alarming rate of distance gains on the PGA TOUR is proving capable of fundamentally shifting the classical foundations of the game. In the STS Research Paper, discussion centers around the vast array of perspectives surrounding and the merits of potential solutions addressing this issue. As golf navigates modernity, it will be important for the stakeholders of the game to consider both the role of data and the response to distance gains in light of what is most healthy and sustainable for the golf industry.

Gameforge Golf sought the expertise of the UVa Systems and Information Engineering Department in the process of developing a data-driven recommendation system for elite golfers. Driven by a belief that players would benefit from practice regimens constructed from statistical insights, not conventional wisdom, Gameforge has amassed a plethora of data describing both practice and tournament performance. The first portion of the Capstone project centers around finding a statistical link between these two datasets, allowing Gameforge Golf to provide data-informed recommendations to players seeking to bolster their practice. While the current limitations of the data obscured many of the potentially significant relationships, the Capstone team created a robust modeling framework for Gameforge Golf to use once the proper data is collected. Second, using PGA TOUR and LPGA data scraped by Gameforge Golf from the

Internet, the project identifies the key drivers of both performance improvement and decline for the world's best female and male players. The knowledge of these influential statistics will help Gameforge Golf structure its services for both users on these professional tours and those not on tours, but seeking to improve in similar fashions. The Technical Report of this portfolio describes the processes and results of these two efforts.

No one issue threatens the future of the game to the degree of distance gains – the topic of the STS Research Paper. Golf courses architects fear their classical designs are losing value, everyday fans struggle to relate to the astronomical distance of professionals, rank-and-file TOUR players worry their livelihood is becoming inaccessible, and equipment manufacturers wrestle with the partially unwarranted ire of the golf community. The research presents both the dissentious perspectives of the game's stakeholders and the potential of several proposed solutions. Bruno Latour's Actor Network Theory, along with the methodology of wicked problem framing, helps consolidate the fragmented discourse surrounding the PGA TOUR's distance concerns. In addition to PGA TOUR data, a variety of primary sources – player interviews, official PGA TOUR reports, equipment company statements, architectural commentary, and more – are used to build the actor network of the PGA TOUR. The STS Research Paper presents a comprehensive view of the many perspectives surrounding distance gains on the PGA TOUR.

The simultaneous research of each of these topics enhanced the quality of research and analysis in both the Capstone Project and the STS Research Paper. The quantitative analysis used in the Capstone Project added a technical dimension to the STS Research Paper, as the skills and performance statistics used by Gameforge Golf helped guide the time series analysis describing changes in player skillsets. The qualitative research performed in the STS Research Paper

contextualized the data and modeling of the Capstone Project, placing the concurrent developments of both distance gains and adoption of data analysis within the larger framework of the game. Simultaneous work on the Capstone Project and STS Research Paper allowed for valuable insights that might not have been reached otherwise.