

A Case for Using AI Technology in Figure Skating

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Abstract

The scoring process in figure skating is prone to errors because of its inherent subjectivity. Although there are challenges, AI is a viable tool to reform the scoring system as it can reduce bias in judging, eliminate score manipulation, and quicken the scoring process. Figure skating's problems arise from relying on a human panel of judges, but in this paper, I argue that AI can mitigate these problems. I also consider alternate claims regarding AI, such as the fact that AI is not truly unbiased and that it could have a disrupting effect on the sport. I further analyze the claim that AI is not competition ready. While these positions have merit, I show that despite the drawbacks, an AI system remains the best solution. The scoring problems present in figure skating have many tangible impacts, and I conclude my paper by emphasizing the need to resolve these problems effectively.

Keywords: Code of points, judge bias, figure skating, artificial intelligence, winter olympics

A Case for Using AI Technology in Figure Skating

In this paper, I argue that the scoring system in figure skating needs reform through the implementation of AI technology. The current scoring system, known as the Code of Points (CoP) system, was introduced in 2004 and was a complete overhaul of the previous 6.0 system. The CoP system was introduced following the 2002 Winter Olympics figure skating scandal, where it was revealed that two judges colluded to predetermine the outcome of the figure skating competition. However, despite the creation and implementation of a new rulebook, some note that the 2004 reforms have not addressed many of the underlying issues still present in the sport (Looney, 2012). This paper will explore how the scoring system in

figure skating can benefit from further improvements in the form of the introduction of new technologies.

I support my position on introducing new reforms with the following three arguments. First, the subjectively judged nature of figure skating means that judges may award scores inequitably, based on external factors. In fact, multiple studies have reported cases of judges exhibiting biases such as nationalistic bias or reputation bias in subjectively judged sports, including figure skating (Emerson et al., 2009; Findlay & Ste-Marie, 2004; Zitzewitz, 2012). Second, the structure of the CoP system allows judges to manipulate certain segments of a skater's score with minimal detection. Looney (2012) argues that some judges manipulate scores by purposefully inflating or deflating the marks in the program components section. Finally, AI technology can make the sport more accessible to viewers by speeding up the scoring process. According to Mazurova et al. (2021), AI technology can expedite the process of real-time judging without compromising on accuracy, thus making the sport more inviting to viewers.

I also consider alternative positions on the subject of introducing scoring reforms in figure skating. First, some argue that AI technology is still in its infancy and may not be a viable option to use in competition (Brady et al., 2022; Liu et al., 2020). Second, I am proposing AI technology as a solution to the biased decision making of human judges, but some studies show that AI systems can exhibit their own biases (Srinivasan & Chander, 2021). Third, one problem with the introduction of new scoring instruments is that they may disrupt the sport and skaters themselves, as it would be a sizable adjustment to make (see Chen & Davidson, 2022). While these positions have merit, I show that many recent studies demonstrate the potential uses of AI or other computerized technology in sports such as figure skating (Bruening et al., 2018; Liu et al., 2020; Mazurova et al., 2021). Regarding the second position, while AI technology does not remain free from bias, it can be programmed to reduce it, and can therefore positively supplement the judging process in figure skating (Srinivasan & Chander, 2021). Last, while there will likely be an adjustment period, I argue that the long-term impact of introducing AI technology will benefit skaters and the sport, not hinder it (see Spitz et al., 2021).

This paper is important because leaving the scoring system in figure skating unchecked could potentially damage the sport. Figure skating is a sport that is most popular every four years, during the Winter Olympics. Outside of the Olympics, it is not a sport that enjoys much widespread popularity, partly because of the aftermath of the 2002 scandal, which has driven many fans away (Garcia, 2018). Therefore, having a scoring system that is unfair and that props up certain skaters based on factors unrelated to their actual performances may drive away potential fans from an already niche sport. Legitimacy is an important element in any sport, and if a sport is perceived as illegitimate, it could alienate viewers as well as the athletes themselves.

Background

The scoring system in figure skating underwent a major overhaul following the scandal in 2002. In the aftermath of this scandal, the International Skating Union (ISU) chose to replace the previous 6.0 system with the new Code of Points (CoP) system. The 6.0 system was highly subjective, while the CoP system was created to reduce the degree of subjectivity in judging. According to the rules of the 6.0 system, “each event was judged by an odd number of judges, and the winner of the event was the skater placed highest by a majority of these judges” (Scoring System, n.d., para. 14). The CoP system has more clearly defined rules and guidelines on how to judge skaters. In the CoP system, there are two segments that constitute the overall score of a performance: the Technical Score and the Presentation Score.

Each element performed by a skater has a numeric value attached to it based on its difficulty. This value is known as the base value (BV) and it is assigned to elements such as spins, jumps, lifts, or step sequences. Judges will then award points based on the quality of the element performed, known as the Grade of Execution (GOE) of the element. The BV and GOE are added together to get the total Technical Score. The Presentation Score is more subjective. The Presentation Score is marked based on the quality of the five program components: Skating Skills, Transitions, Performance, Composition, and Interpretation of the Music. The total segment score is calculated by adding the Technical Score and the Presentation Score and subtracting any deductions (ISU Judging System, n.d.).

The Advantages of Implementing AI in Figure Skating

Most subjectively judged sports such as diving, gymnastics, and figure skating have been scored by a panel of judges, often with minimal technology. This technology is generally limited to video replays or, in the case of figure skating, an ice scope that can measure the height and distance of jumps. In the following sections, I argue that figure skating can benefit from introducing new, computerized technology to aid judging panels. This technology can help reduce bias, ensure fairer scoring, and reduce the time it takes to judge skaters. An AI based scoring system would be beneficial to not just figure skating but other subjectively judged sports as well.

Judging Bias

Biased decision making is common in many sports. More specifically, examples of biased decision making can be found in various types of sports such as individual sports, team sports, and judged sports. The prevalence of bias across sports demonstrates that referees and other sports officials are not always impartial figures. For example, in soccer, one study suggests that referees tend to add more injury time at the end of a match if the home team is trailing by a goal (Garicano et al., 2005). Similarly, a study of the 2003 Muay Thai World Championships revealed that judges scored competitors of their own nationality more favorably as compared to competitors of a different nationality (Myers et al., 2006). Judging bias is present even at the Olympic level, as evidence of nationalistic bias has been reported across many Olympic sports such as diving, ski jumping, and artistic gymnastics. The literature suggests that biased judging altered the medal placements in the diving competition at the 2000 Summer Olympics and resulted in compensating biases among ski jumping judges at the 2002 Winter Olympics, and this was found to be present in the artistic gymnastics competition at the 1984 Summer Olympics (Ansorge & Scheer, 1988; Emerson et al., 2009; Zitzewitz, 2006). Thus, it can be surmised that judging bias can be found in a wide range of sports.

Figure Skating is not exempt from the problems of biased judging. Figure skating judges have been accused of picking favorites since the early days of the sport, indicating that the problem of biased judging is a long-standing one. For example, at the 1906 World Championships in Munich, Swedish skater Ulrich Salchow refused to participate over concerns that he would be scored unfairly in favor of the Munich born skater, Gilbert Fuchs (Ulrich Salchow, n.d.). While it is impossible to evaluate whether Salchow's claims were true, it is worth noting that Fuchs won the men's event at that competition. Moreover, the Cold War saw the emergence of bloc-based voting and bloc bias among figure skating judges. During the Cold War era, judges from NATO countries and Warsaw Pact countries would significantly mark skaters down if they belonged to the opposite defensive alliance, while

scoring their countrymen higher in comparison (Sala et al., 2007). These examples highlight that the history of figure skating has been riddled with incidents of judging bias.

Recent studies highlight that biased judging has continued to be a problem in figure skating. Bloc-based judging has receded following the end of the Cold War but nationalistic bias, as well as other biases, have remained a constant. For example, Auweele et al. (2004) and Findlay and Ste-Marie (2004) note that judges frequently award marks to skaters based on their reputation, the marks awarded by other judges, the order they perform in, or their nationality. Furthermore, figure skating judges have exhibited nationalistic biases even at the Olympic level, as demonstrated by Zitzewitz (2006) and Looney (2012). These studies show that the pervasiveness of judging bias is a significant problem that has remained unsolved. However, AI technology can counteract this issue. That is, AI systems are free of many of the biases and problems that are inherent in human judging panels. According to Mazurova et al. (2021), AI systems are not biased regarding factors such as reputation or nationality. The authors further note that AI mitigates the human biases and inefficiencies that can influence the judging process. Therefore, the introduction of AI can help solve the decades-old problem of judging bias.

Score Manipulation

The scoring issues meant to have been addressed by the 2004 scoring reforms persist in figure skating. According to the ISU, the scoring system was reformed to limit the possibility of judge collusion and increase the fairness of the scores awarded. However, one novel aspect of the newly introduced CoP system, the “Program Components” section, has presented its own set of problems. Program components cover the artistic side of figure skating such as skating skills, interpretation of the music, and transitions, and they are a part of the Presentation Score (ISU Judging System, n.d.). As discussed in Lom (2016), the CoP system was specifically created with clear and rigid guidelines to limit the marks a judge could grant subjectively. By contrast, Looney, (2012) argues that the new system has not achieved this aim. As the program components section of the new scoring format allows for some degree of subjectivity, it is also easily manipulable by judges. In fact, the evidence presented in the study suggests that judges *do* use the program components to artificially inflate or deflate scores.

These persisting issues have had significant consequences on individual athletes in the sport. Osorio (2016) notes that subjective judgements are inherently open to manipulation. There is evidence of the same occurring in figure skating. Looney (2012) describes how in the lead-up to the 2010 Winter Olympics, there were questions about the validity of certain scores that were given. More specifically, Evgeni Plushenko, a gold medal contender at the time, commented that judges gave skaters who had no transitions in their programs, like himself, high transition marks to manipulate the scores. Similar questions arose during the subsequent 2014 games when the scoring came under public and media scrutiny once again. According to Looney and Howell (2015), it was believed that two Russian skaters (Plushenko again, and Adelina Sotnikova, the eventual gold medalist) were given inflated scores because the judging panel was largely comprised of judges from former Soviet countries, implying a conflict of interest. Therefore, the fact that score manipulation is present even at the highest level of the sport indicates that the issue needs to be managed.

The literature suggests that AI can adequately tackle the issue of score manipulation. Limiting human involvement in the scoring process means that there is less opportunity for the scores to be falsely manipulated. Indeed, Brady et al. (2022) argue that a well-programmed AI system can help make judgments in sports appear fairer to fans, judges,

and athletes alike. AI can also ensure fair and equal judging globally, by bringing uniformity to the scores awarded across competitions. The authors further highlight that figure skating is one of many aesthetic sports that could reap the benefits of an AI system as it would reduce some of the subjectivity, thereby limiting the sport's vulnerability to score manipulation. Adding to this position, Leveaux (2012) as cited in Mazurova et al. (2021) notes that technology can make decisions in sports more transparent, and subsequently more correct. Thus, AI technology is a feasible solution to the problem of score manipulation.

AI Can Quicken and Improve the Accuracy of Judging

Making quick judgements is an important factor in almost any sport. When the Video Assistant Referee (VAR) technology was introduced in soccer, many were concerned that it could increase the time taken to officiate, and lengthen matches (Chen & Davidson, 2022; Spitz et al., 2020). Longer decision-making times are undesirable in sports as it can be exhausting for athletes to undergo long waits. Long decision-making times could also make a sport less spectator-friendly for both live and television audiences (Mazurova et al., 2021). In fact, sports that are not fast paced tend to gain the reputation of being boring sports. For example, the long pauses and infrequent moments of action in baseball have led many to perceive it as a boring or slow sport (Orlin, 2014). With the popularity of figure skating not being as high as sports like soccer and baseball, quicker judging could be important in making the sport more enticing to viewers.

Although slow judging is not uncommon in sports, AI has the potential to improve and speed up the scoring process in figure skating. According to Mazurova et al. (2021), humans' ability to process information is inherently slow, while some of the strengths of AI include speed and efficiency. The article goes on to suggest that AI could even outperform humans in cognitive tasks. Furthermore, the authors highlight that AI effectively eliminates many factors that can influence human judging such as fatigue and tiredness. In other words, AI is not susceptible to the external forces that affect humans. Adding to this position, Brady et al. (2022) explain that the use of AI in sports like Formula One has shown that AI can make decisions faster than humans can. These studies indicate that AI is an effective way to quicken the pace of figure skating.

The Disadvantages of Implementing AI in Figure Skating

Although AI technology has the potential to positively impact the sport, some argue that such changes to the scoring process can have unwanted side effects. These opposing viewpoints range from fears that it could hamper the sport to concerns that such technology is not up to par to be used in actual competition. Although these arguments are not without merit, I show that the benefits of AI outweigh these concerns, which can be resolved as the scoring system gradually transitions into an AI based system.

Disruptions to the Sport

Some contend that changes to the scoring system could disrupt the sport and skaters themselves. This position is not without merit as the 2004 reforms also raised concerns among skaters. That is, some skaters were concerned that the new scoring system could devalue the artistic component of skating and instead emphasize technical elements (Zitzewitz, 2006). These concerns appear to have been realized as multiple skaters agreed with one judge's view that the presentation side of skating has been impacted by the CoP system (Lom, 2016). Introducing novel technology to the sport could generate similar views

among skaters today, as has been the case in other sports. For example, in soccer, the implementation of the aforementioned VAR system has come with its own share of the kind of controversial decisions it was meant to prevent (Chen & Davidson, 2022). Similarly, in tennis, some have questioned the accuracy of Hawk-Eye technology, particularly during the early days of its implementation in the sport (Sanderson, 2008). Thus, the transition to a different scoring system may not be seamless, but is still necessary to implement.

Despite the side effects, I argue that the long-term benefits of implementing AI systems will override any short-term drawbacks. According to Mazurova et al. (2021), AI can mitigate many of the problems with figure skating scoring that have been outlined in previous sections. The study highlights that AI can overcome issues of judging bias, transparency, accountability, and adaptability. Studies by Emerson et al. (2009), Looney and Howell (2015) and Mazurova et al. (2021) have demonstrated that the continued presence of such issues in sports can negatively impact athletes in many ways, including by altering medal placements. The fact that AI can solve these issues suggests that in the long-term, the impact of AI will largely be positive. Furthermore, Singh Bal and Dureja (2012) and Spitz et al. (2020) have shown that the Hawk-Eye system in tennis and VAR in soccer have been beneficial to each respective sport, despite the controversies. Therefore, AI in figure skating is likely to have a positive impact on the sport in the long term.

AI Technology Is Under Development

There are arguments made by some that suggest that the current level of AI technology is not fit for use in competition. For example, Liu et al. (2020) note that the development of action recognition and deep learning have been slow within competitive sports. This finding is significant as action recognition and deep learning are important subfields within the field of AI. In addition, Brady et al. (2022) highlight that the development of AI, and the effects it will have on competitive sports, can only be measured in the forthcoming years as AI is still not fully developed within sports. These studies demonstrate that while progress has been made, the utilization of AI within sports has been a slow process. As a result, the argument that AI is not competition-ready is not without merit.

Although AI cannot be introduced immediately, it can be introduced progressively. That is, while AI might not be ready for implementation immediately, it could certainly be developed as an option for the near future. For instance, the International Federation of Gymnastics is in the process of developing an AI-powered hybrid judging system called the Judging Support System (JSS) for artistic gymnastics, a sport with many similarities to figure skating (Mazurova et al., 2021). Furthermore, multiple studies have highlighted the viability of using new technology to score skaters. For example, a wearable jump monitor that can measure elements of a figure skating jump such as jump height, jump identification and number of revolutions has shown promising results with minimal inaccuracies (Bruening et al., 2018). The progression of AI within sport also suggests that the initial introduction of AI in figure skating is likely to consist of a human-AI hybrid system, such as the JSS, which may help in the transition.

In addition to new technology, multiple figure skating datasets have been created that are useful for machine learning, an important element of AI technology (Xu et al., 2020; Liu et al., 2020). The creation of figure skating datasets and figure skating specific technology demonstrates the viability of building an AI based scoring system for figure skating. Similarly, the JSS system that is being developed for gymnastics is one example that shows the possibility of creating a similar system for figure skating as the two sports share several similarities. These similarities include elements such as jumps, turns, spins and choreographic components. Therefore, these developments illustrate the ways in which AI can be

implemented in figure skating, which in turn would allow for a gradual transition to a hybrid AI based system. A gradual transition also allows for improvements to be made at every stage, the normalization of such a system within the sport and judging panels to acclimatize to the change.

Bias in AI

Some critics may argue that AI systems are not free from bias. It is not untrue that AI can exhibit its own set of biases that are different from human biases. According to Mazurova et al. (2021), AI could be biased in undetectable ways, as compared to human biases. The authors note that gymnasts have different body types and gymnasts from different countries have their respective national styles. An AI-powered system could therefore be partial towards one body type (e.g., shorter gymnasts) or a particular national style (e.g., American vs. Russian). The same can be said for figure skating as different countries coach the sport in different ways, meaning that an AI system for figure skating could be biased in similar ways. Furthermore, Srinivasan and Chander (2021) note that there are a host of other biases that can be built into an AI system such as sampling bias, measurement bias, and human evaluation bias.

Although AI contains its own unique biases, it does eliminate almost all human biases. That is, AI remains free from human biases such as bloc-based bias, nationalistic bias or reputation bias. In addition, an AI system can mitigate the human inefficiencies that could intentionally or unintentionally contribute to the creation of such biases (Mazurova et al., 2021). Despite the elimination of human biases, AI indeed contains biases of its own. However, unlike human biases, biases within an AI system can be managed to some extent. While it is not possible to eliminate all biases from an AI system, efforts can be made to mitigate or reduce them (Srinivasan & Chander, 2021). In fact, multiple studies examine how bias can be mitigated in AI systems (see Mehrabi et al., 2021). While AI may not be a perfect solution, it inarguably is a feasible one, particularly because a slow transition to using AI would mean that biases can be eliminated with continued and repeated use.

Conclusion

In this paper, I argued that AI technology is a possible solution to the problems that are present in figure skating's CoP scoring system. Finding a solution to the scoring problems is a necessary step because leaving these problems unchecked could hurt the sport in the long run by making it less compelling to watch. Therefore, implementing an AI system in competition can mitigate, if not eliminate the many problems associated with having a human panel of judges and raise the overall quality of the sport. AI is free from human biases such as reputation bias, nationalistic bias and bloc-based bias. AI also eliminates the possibility of artificial score manipulation, which is common in subjectively judged sports. Furthermore, AI can improve the real-time scoring process by making it quicker, and as a result, more enjoyable for viewers.

Despite the many benefits of using an AI system to score athletes, AI is, as yet, not a perfect solution. AI skeptics argue that introducing novel technology and altering the role of judges in the sport could have a disruptive effect on athletes. Nevertheless, this paper demonstrates that technological changes that improve a sport in some capacity are beneficial in the long term regardless of any short-term pushback. Others point to the relative newness of AI to support why it is unsuitable or insufficient for use in competition. Regarding this position, the evidence strongly suggests that while AI may not be an instant solution, it has undergone enough development to be used gradually, which would also give developers the

time to make steady improvements. Finally, AI may be free from human biases, but it is not free from all biases, as it can still exhibit specific biases of its own. However, unlike humans, AI systems can be programmed differently and, in this case, be adjusted to eliminate these biases.

The available evidence highlights that figure skating is a sport with many deeply rooted problems that have been allowed to fester. Over the years, there have been judging scandals, contentious scoring decisions, and most recently, a doping scandal at the Olympics. No sport is free from such issues, but in figure skating, some of the issues can be mitigated using AI. For example, in soccer, VAR does not eliminate a referee's dubious calls, but it certainly reduces the possibility of such calls. Similarly, AI can address the major difficulties that arise with having a panel of judges. Problems such as doping are not always easy to prevent but scoring problems are preventable to a certain degree. Leaving the question of scoring unaddressed could prove damaging in the future, as it invites the possibility of future scoring controversies. Therefore, AI is an important tool that can help keep figure skating fair and prevent the erosion of its perceived legitimacy.

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