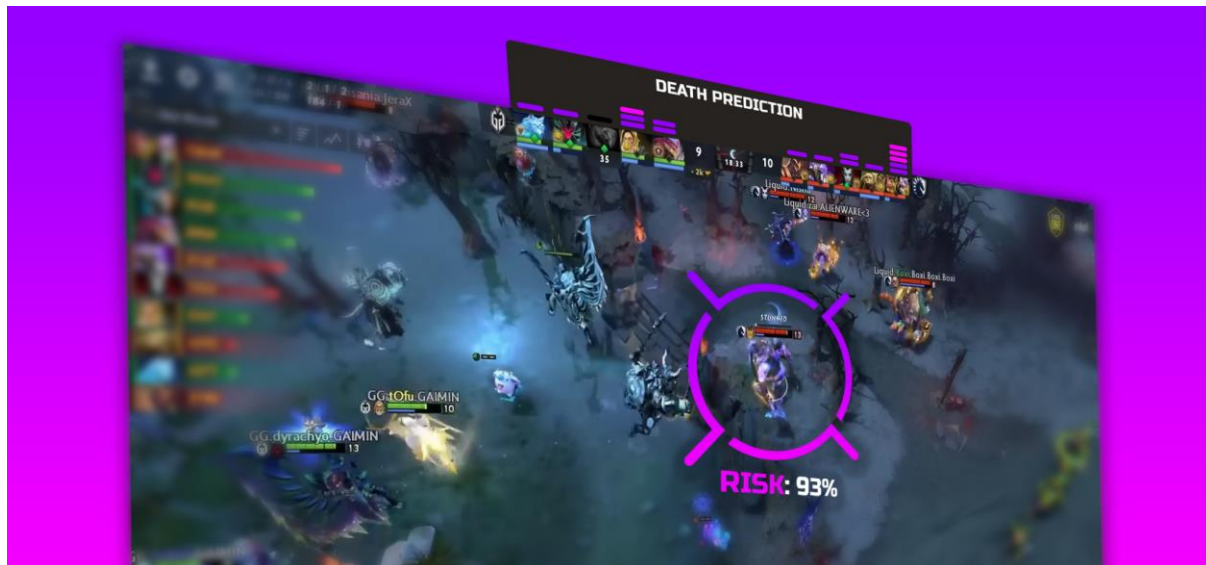


## The Data-Driven Future of Esports Broadcasting: Predicting Death in Dota 2

### Summary

*Death is a critical event in Dota 2, but with fast-paced gameplay and limited camera angles, it's often missed in broadcasts. The Time to Die 2 framework uses deep learning to predict player deaths five seconds into the future, informing commentators, improving the viewing experience for esports fans and providing valuable insights for team coaches. The death prediction model offers a high degree of accuracy and opens up new predictive possibilities for data-driven storytelling in esports broadcasting.*



### Introduction

In recent years, the world of esports has exploded in popularity, with millions of fans tuning in to watch professional gamers compete in popular titles like *League of Legends*, *Dota 2*, *CS:GO*, *Overwatch*, and *Fortnite*. As the esports industry continues to grow, it has become increasingly important for organizers and teams to create engaging and innovative experiences that keep fans coming back for more.

One way that esports organizations are doing this is by leveraging data-driven insights to enhance the broadcast and thereby the viewing experience for fans. But this is not always without its challenges. For example, one of the most popular esports games is *Dota 2*, a complex and fast-

paced game that presents unique challenges for broadcasters, particularly when it comes to camera positioning and producing compelling commentary.

One key event in *Dota 2* is a player's death, which can have a major impact on the game's outcome. However, with just one camera monitoring the entire playfield, death events are often missed in broadcasts. This is where the *Time to Die 2* framework comes in a machine learning model that uses deep learning and thousands of data points tracked in real-time to predict when someone will die in *Dota 2*, five seconds into the future.

### **The Importance of Death Prediction**

Predicting the likelihood that a player is going to die in a game of *Dota 2* is a big deal in the burgeoning field of esports analytics. Prediction systems are operationalized by esports broadcasts to enrich content delivery, e.g., by informing commentators that a certain player is likely to die soon. This becomes more attractive when you consider how difficult commentating *Dota 2* is. The game is highly complex, and it can be hard for commentators to assimilate the high volume of information present in the game in real time.

Moreover, prediction systems can detect dangerous moments in a game before they develop. Analysing the output of the model to identify when a dangerous situation may be developing would allow team coaches to train players to avoid situations where the danger would not have previously been observed.

### **The Complexity of Dota 2**

*Dota 2* is one of the largest esports titles, and from the perspective of data science, it is also wildly complex. Consider that each player selects a unique hero from a pool of about 120 at the start of the match, resulting in about  $1.16^{14}$  possible starting hero combinations. Furthermore, during gameplay, players have many options for strategy, e.g., they can choose from over 200 items to purchase, each with a unique effect. Additionally, timing when to focus on attacking or defending in-game objectives is very important. Each player on a team has a different role to play, similar to positions in traditional team sports, and teams must coordinate these different roles to perform effectively. Gameplay is further complicated by the 'fog of war', a mechanic which means that the players in *Dota 2* have a limited view of the battlefield.

### **The Solution: Time to Die 2 Framework:**

The *Time to Die 2* model is an advanced machine-learning model designed to predict when a player is likely to die in *Dota 2*. It is built on deep learning techniques and trained on thousands of data points tracked in real-time during gameplay.

To make accurate predictions, the *Time to Die 2* model takes into account various factors that affect a player's risk of dying in the game. These include the player's health, the number and type of enemies nearby, the player's position on the map, and the status of their abilities and items. The model also analyses historical data from past matches to identify patterns and trends that can help it make more accurate predictions.

It is possible to curate large datasets of highly granular, high-dimensional, high-volume data from virtually every match for *Dota 2* due to the open nature of the replay system, a tool which allows players to download 'replays' of past matches and play them inside the game client. Such large

datasets allow data scientists to start breaking down the incredibly complex "data space" that *Dota 2* comprises. The *Time to Die 2* framework was trained using data from 9,822 *Dota 2* matches, but it still took three years of time across a dozen scientists to build the framework.

Using this wealth of data, the *Time to Die 2* model can predict when a player is likely to die up to five seconds in advance. This may not sound like a lot, but in the fast-paced world of *Dota 2*, five seconds can make a significant difference. This is just enough time to move the camera, sound an alert, and dramatically improve the lives of esports commentators and broadcasters - and thereby the viewing experience. It gives commentators and broadcasters enough time to react and provide engaging commentary to enhance the viewing experience for fans. It also provides a tantalizing view of what might be possible in physical sports in the future, as data capture from e.g. football and basketball matches ramps up.

## Conclusion

Data-driven experiences are becoming an increasingly important part of the esports industry, and organizations that are able to leverage data to create personalized, engaging experiences for fans are likely to have a competitive advantage.

Machine learning is transforming the world of esports analytics, and in particular, prediction models like *Time to Die 2* are revolutionizing the way we watch and analyse *Dota 2* matches. Our model uses a deep learning algorithm to predict death events five seconds in the future, providing crucial information for broadcasters, commentators, and coaches. With the rise of esports as a major form of entertainment, the need for advanced analytics and real-time predictions has never been greater, and we believe that our approach can be adapted to other esports titles as well.

As the field of esports continues to grow, we expect that machine learning-driven analytics will play an increasingly important role in shaping the future of the industry.

## Full research report:

### Time to Die 2: Improved In-Game Death Prediction in Dota 2

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Available here: <https://doi.org/10.1016/j.mlwa.2023.100466>

For more information about data-driven audience experiences in esports:

### DAX: Data-Driven Audience Experiences in Esports

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