



How Google AI will make England's preparations more efficient than ever before

Google Cloud is working on a proof of concept to help The FA supercharge penalty analysis

Marginal gains have never been more important, and data plus AI have become increasingly vital with the help that they provide the England Women's Senior Team in gaining competitive advantage

As the popularity of the women's game has grown, so has the amount of data points. Being able to leverage that data is every nation's goal, and the Lionesses' support team are doing all they can to use data for smarter decision-making. Tournament football is inherently unpredictable, marked by potential underdogs, rising stars, and unforgettable moments.

Pressure is intrinsic to football, especially during tournaments. The Lionesses have demonstrated their ability to handle pressure, notably in their previous Euros campaign coming from behind against Spain to secure victory in extra time, and in the final keeping their focus in extra time to score *that* goal that will be etched in history forever.

Tournament football inevitably brings penalties (and penalty shootouts) into sharp focus, arguably the most high-pressure situations in sport. Coaches and staff strive to prepare players thoroughly, minimizing the element of luck inherent in these moments.

Each nation will come into the tournament with their penalty strategy, which often leads to a manual burden for analysts.

Traditionally there have been 2 challenges with doing analysis on penalties:

1. **Manual effort** - an analyst would need to watch hundreds of videos of penalties and code the direction the taker went and if they were successful
2. **Non identical video streams** - given not all games are televised there are inconsistent broadcasting angles which has made it difficult to use technology to automate the task in the past

Google Cloud, The FA and GlobalLogic have been working on a proof of concept update to The FA's current penalty analysis tool, using AI - one that will hopefully be used in tournaments to come. By leveraging Google Cloud's Vertex AI suite to tag hundreds of penalties in minutes, this will allow Analysts to develop an understanding of previous penalty strategies and analyse large amounts of video in seconds rather than hours. This proof of concept has been made for the Lionesses and they will be the first England team to benefit from AI.

The penalty analysis tool ingests hours of penalty footage and tags whether the penalty was scored, saved or missed. Once this action has been completed the Assistant will also tag the goal penetration zone, i.e. where the ball made contact with the goalkeeper, goal or zone surrounding the goal. Finally, it also understands which direction the keeper went and whether this decision was correct or not. Especially during a tournament, when time is at a premium, the inclusion of Google AI will ensure accuracy and enable analysis to be conducted at far greater scale and volume.

"Working together with Google Cloud and GlobalLogic will allow us to use AI to supercharge an existing tool and allow us to be more efficient, conducting analysis at a greater scale and volume than previously possible. During tournament scenarios when time is at a premium, this will be particularly important."

Alan Swan, Product Manager, The FA



Solution Overview

The Solution Architecture consists of several building blocks, described below. These blocks form part of a process that allows Analysts to review the data alongside video footage to create bespoke insights for players.

1. Data Ingestion and Storage:

Raw video feeds are ingested and securely stored in **Google Cloud Storage Buckets**. This provides a durable and cost-effective foundation for the massive video datasets.

2. Automated Build and Deployment:

By leveraging GCP Infrastructure-as-Code capabilities, the CI/CD pipeline connects directly to **Artifact Registry** at the script level. This approach lets The FA set custom deployment settings in their own environment while maintaining full compatibility with the workflow required by Vertex AI.

3. Orchestrating AI Workloads with Vertex AI:

The heart of the analytics pipeline lies in Vertex AI, Google Cloud's unified AI platform. **Vertex AI** orchestrates the entire AI workflow, from model deployment to scalable execution. The system utilizes the **Vertex AI Custom Job API** to define and manage the video analytics tasks. This allows The FA to run their custom AI models on demand, leveraging the power of Google Cloud's infrastructure.

4. Scalable Compute Resources:

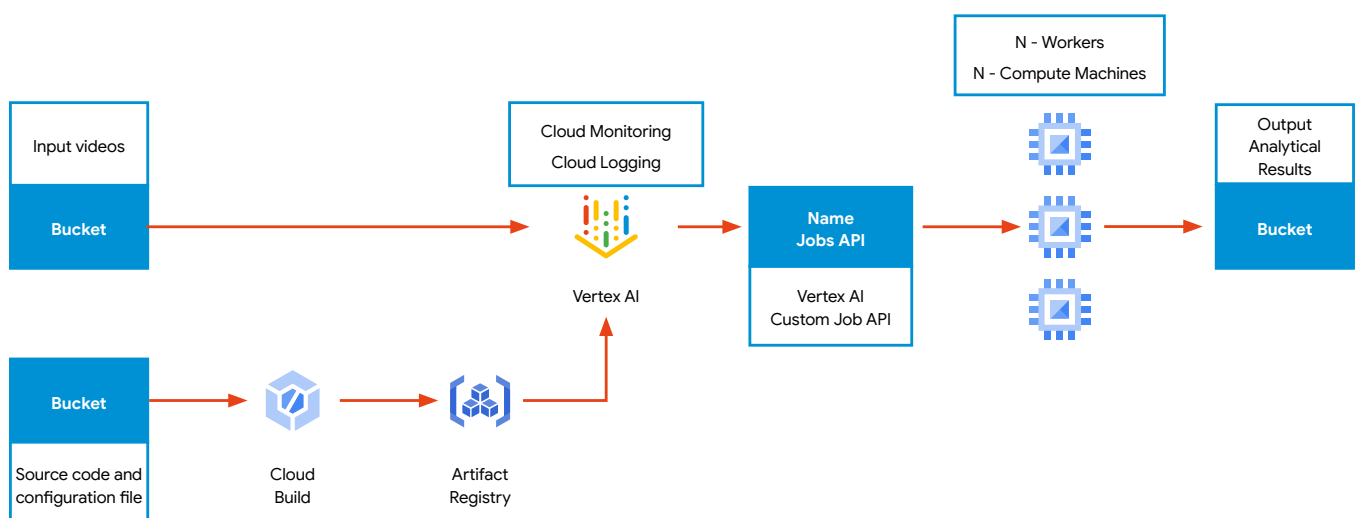
When a video analytics job is triggered through the Vertex AI Custom Job API, Vertex AI dynamically provisions workers consisting of compute machines. This elastic scaling ensures that the platform can handle fluctuating workloads efficiently. As the volume of video data increases, the number of Compute Machines can be automatically adjusted, providing the necessary processing power without manual intervention.

5. Monitoring and Logging for Operational Excellence:

To maintain the health and performance of the analytics pipeline, The FA integrated **Cloud Monitoring** and **Cloud Logging**. Cloud Monitoring provides real-time visibility into key metrics, allowing them to track resource utilization and identify potential bottlenecks. Cloud Logging aggregates logs from all components of the system, facilitating debugging and troubleshooting.

6. Output and Insights Delivery:

Once the video analytics tasks are complete, the **Output Analytical Results** are stored in another **Google Cloud Storage Bucket**. This allows The FA to easily access, analyze, and integrate these insights into their downstream applications and deliver valuable intelligence to their customers.



Failing to prepare, is preparing to fail

Whilst the penalty analysis tool will help reduce the manual tasks on analysts it won't decide tournaments. Our relationship with The FA has always focused on helping the team behind the team and this solution frees up vital hours for coaches and analysts to spend on the grass.

