Solution Brief

AI Vision
Higher Education

Swiss University Deploys AI-Based Video Inference to Detect Fraud on Remote Exams

With development support from Intel, Switzerland's Distance University of Applied Sciences deployed an AI-enhanced proctoring solution, optimized with the Intel® Distribution of OpenVINO™ toolkit and tested on Intel® DevCloud for the Edge.

FFHS
Fernfachhochschule Schweiz
Mitglied der SUPSI

Even with more than 20 years of experience in distance learning for undergraduate- and graduate-level degree programs in applied sciences, Switzerland's Distance University Fernfachhochschule Schweiz (FFHS) faced a challenge in administering and evaluating student exams. While FFHS excels at delivering a high-quality education to its students, the university did not have an efficient way to detect or deter cheating on exams administered remotely.

When the COVID-19 pandemic led to shutdowns of university campuses worldwide, distance learning became the norm, and in-person testing was eliminated. Other universities were now grappling with the transition to online learning and testing, and FFHS led the way.

FFHS began by recording students' test-taking activities via webcam,[1] with the goal of examining the footage afterward for signs of attempted cheating. This process proved unwieldy, as analysis took at least an hour per exam, and about 4,000 such reviews would be needed during each semester.[2]

FFHS recognized that its fraud analysis process required automation—to free staff members from the enormous demands on their time—and to enable instructors to provide timely feedback on the students' performance. The university began work on an AI-driven proctoring system, but its initial trial harnessed a proprietary GPU technology that did not deliver the required results.

Instead, FFHS migrated its workload and models to Intel DevCloud for the Edge and its developers leveraged the Intel® Distribution of OpenVINO™ toolkit to deliver an intelligent, adaptive "virtual proctor."

The new system recognizes behavior patterns associated with cheating and excerpts only those snippets from each session of 90 minutes or longer. The system automatically creates a short video of the excerpts to be reviewed later by a faculty member. The human proctors were able to complete a review of each exam's video excerpt in two to four minutes, instead of one to two hours per session for the original footage.[1] When the system is fully automated, the professor will need to view only those videos that include suspicious behavior.

OpenVINO™

Challenge: Fraud detection on remote exams took 4,000+ hours per semester

FFHS needed a more efficient way to detect possible fraudulent behavior from students during online exams. The university's previous solution was to have a proctor search for indications of cheating in the one to two hours of webcam footage that captured each student's testing session. The catch: there were 4,000 such videos to be reviewed every semester.

Solution: AI-based solution detects cheating quickly and accurately

The university set out to reduce or eliminate hours of human intervention in the fraud detection process by harnessing machine learning techniques to detect and flag anomalous behaviors.

With the help of Intel DevCloud for the Edge and Intel Distribution of OpenVINO toolkit, FFHS was able to efficiently create an effective, AI-based solution. The university hosted and tested its development on several nodes in Intel DevCloud for the Edge, which offered a usable, scalable platform for manipulating and analyzing the massive amounts of audio and video data from the recorded exam sessions.

FFHS began with a student identity detection model they had built with client API code in OpenCV and Python—along with its own FaceID detection framework. Intel engineers worked with FFHS to transform the university's model into an advanced proctoring solution, using pretrained models and libraries from the OpenVINO toolkit.

The OpenVINO toolkit–based inference jobs could then be queued for batch processing and testing in DevCloud, on preconfigured nodes with a variety of RAM, CPU, and GPU configurations.

The resulting system automatically detects suspected behaviors and classifies them as "cheating" or "not cheating" with very high accuracy, and compiles video snippets of the suspected "cheating" behaviors for human review. The proctors or professors can scan the short video compilations in two to four minutes each, instead of one to two hours per session.[1]

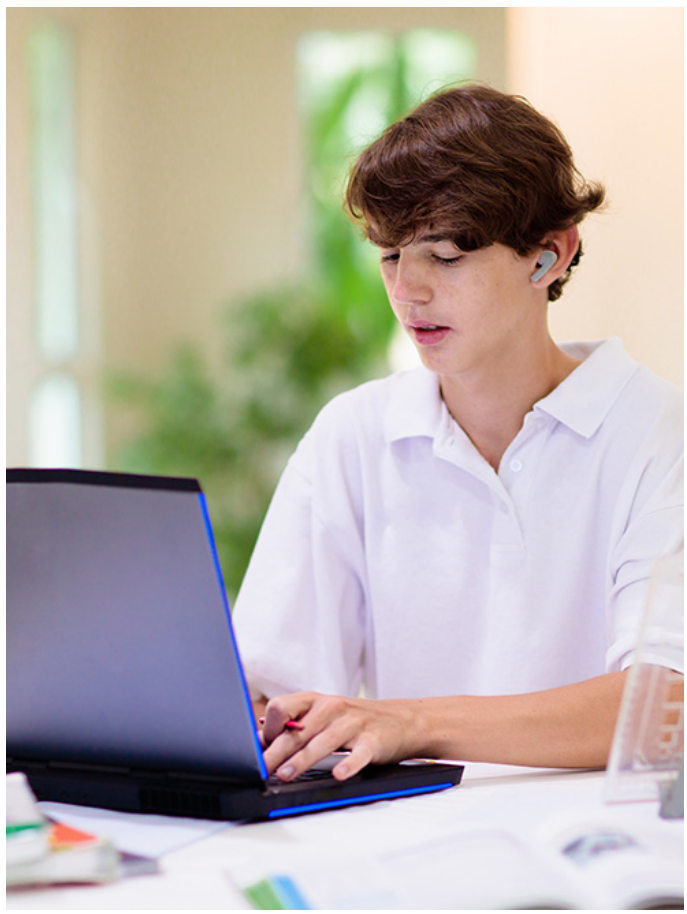
Development in two weeks, from start to finish

While FFHS focused on the time-saving benefits of the fraud-detection solution, the university's developers were almost equally delighted with the smoothness and speed of the development process itself. The Intel Distribution of OpenVINO toolkit was instrumental in accelerating the project's turnaround time, as developers were able to convert models and port frameworks from previous development efforts by leveraging the toolkit's plug-and-play compatibility.

How it works

Webcams and microphones at the students' remote locations recorded student behavior during each exam. The recordings added up to more than 6.5 terabytes of data per semester to be analyzed in a multistep process. Each video and audio file was scanned, assessed, and edited, and the time-stamped video and text snippets were compiled into a separate, short video that revealed the nature and duration of any anomalies.

FFHS tested and adapted its fraud-detection algorithms on Intel DevCloud for the Edge, which provided a training ground for professors and students to integrate their pretrained models and client API code in OpenCV. FFHS also took advantage of Intel DevCloud to test and adapt OpenVINO-derived pretrained models for face detection and head pose estimation to on-screen activity, enabling faculty to recognize anomalies and classify them as either "cheating" or "not cheating."



Solution summary

FFHS deployed Intel Distribution of OpenVINO toolkit's model optimizer, adapting its visual analytics to support pretrained gaze-estimation and sound-classification models.

Intel engineers helped FFHS faculty to adapt demo software in the OpenVINO toolkit, and to integrate code that the university had developed previously in Python and OpenCV.

Using Intel DevCloud for the Edge's job scheduling framework and qsub, FFHS ran the OpenVINO-inferenced jobs on several nodes with an 8-core CPU.

Configurations deployed and tested

- Intel DevCloud for the Edge, nodes idc024 and i5-6500TE
- Intel Distribution of OpenVINO toolkit
- Intel® Core™ i7-10710U processor 16 GB Intel® UHD Graphics
- Intel® Core™ i7-1065G7 processor 16 GB Intel® Iris® Plus Graphics G7
- Intel® Core™ i7 7700 processor 16 GB Intel® HD Graphics 630

Learn more

Intel DevCloud for the Edge
Develop, test, and run workloads in the cloud, on a cluster of the latest Intel® hardware and software. Integrated Intel-optimized frameworks, tools, and libraries provide everything you need for your projects.

Learn more ›

Intel Distribution of OpenVINO toolkit
This toolkit gives developers easy-to-access libraries, frameworks, and pretrained AI models to speed up AI vision developments for faster time to market. Based on convolutional neural networks (CNN), the toolkit extends workloads across Intel hardware and maximizes performance.

Learn more ›

About FFHS

The Swiss Distance University of Applied Sciences (Fernfachhochschule Schweiz—FFHS) is a nationally recognized university that has offered part-time bachelor's and master's degrees and continuing education programs since 1998. With more than 20 years of experience in distance learning, FFHS is the leading distance-learning university in Switzerland. FFHS offers a convenient alternative to students who wish to pursue a degree while continuing to fulfill their obligations at work and at home.

ffhs.ch/en

1. FFHS is in compliance with privacy and data processing laws within the European Union.
2. Internal FFHS testing data.

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