

The Power of Cloud-based Cell Counting

Cloud-based devices and applications have become an important part of our daily lives. You can listen instantly to every song you can think of, watch the latest movies that match your interests, monitor your health anywhere using a watch, easily share large files, and work from anywhere.

The cloud has given us two main things. First, the cloud gave us the ability to store, transfer, and share extremely large data files without complexity or high cost. Secondly, the cloud gave us the ability to use extremely high computing power. Demanding algorithms, which would need to run for minutes or even hours on a normal computer, are crushed into a fraction of the time using the advanced computing power of the cloud. It is these two benefits of the cloud that have transformed our world. Today, we no longer need to buy CDs, rent DVDs, go to a doctor to check our heart-rate, send a USB drive through the mail, or only work at the office.

Corning® Cell Counter: The First Cloud-based Cell Counter

Corning and CytoSMART are bringing the benefits of the cloud to the lab with a new, innovative cell counter. The Corning Cell Counter is powered by the Microsoft Azure Cloud, and is also the fastest cell counter in the world. One of the key benefits of using the Microsoft Azure Cloud is that all cell counts performed with the Corning Cell Counter are stored and analyzed on one of the most secure cloud platforms. Another benefit of a cloud-based cell counter is that new features and cell counting algorithm updates can be offered to the customer without an update process.

The biggest advantage of a cloud-based cell counter is the use of artificial intelligence for cell detection. The artificial intelligence algorithm can recognize cells based on an extensive feature set, while offline cell counters can only look into a short list of features because they are limited to the onboard processing power of the device. Because of the advanced computing power of the Microsoft Azure cloud, the Corning Cell Counter can process an endless list of features in a fraction of the time of traditional cell counters. Furthermore, the image analysis algorithm of the Corning Cell Counter has been trained to distinguish live and dead cells from debris. This makes the artificial intelligence algorithm much more robust for real-world cell counts (e.g., containing debris or clumps) compared to classical image analysis algorithms used for cell counting.

The Corning Cell Counter is the first cell counter with an integrated helpdesk, which is only possible due to the use of cloud-based software. This provides a quick chat support option for the user who has questions or needs instant help.

How Does Cloud-based Cell Counting Work?

After placing a sample on the Corning Cell Counter, simply focus on the cells and press Count. The image is uploaded to the Microsoft Azure cloud where it is analyzed within just a few seconds by the artificial intelligence algorithm. Subsequently, a processed image and a histogram of the cell size are created. In the processed image, live cells are encircled in green and dead cells in red. The raw and processed images and the histogram are displayed in the Corning Cell Counter software and are stored in the Microsoft Azure cloud. Cloud-based storage of the results allows the user to look up their cell counts from any device with an internet browser at any time.

The Benefits of Cloud-based Cell Counting

Because the Corning Cell Counter is cloud-based, updates can be provided on a regular basis without any inconvenience for the user. Since the introduction of the Corning Cell Counter, several new features have been added to the Corning Cell Counter. First, a cell size histogram was added. Subsequently, the possibility to gate the size histogram to exclude too large or too small cells was implemented. And, the option to choose between cell counting with or without the addition of Trypan blue for viability measurements was added.

However, the most comprehensive update has been the update of the artificial intelligence algorithm to count cells. Because of this update, individual cells within cell aggregates are distinguished more accurately and the dead cell detection is improved (Figure 1). Because of the cloud-based data storage and immense computing power, the artificial intelligence algorithm can be trained on large amounts of data, even including images that contain debris or cell clusters. This allows for the creation of a superior algorithm that reflects the needs of users.

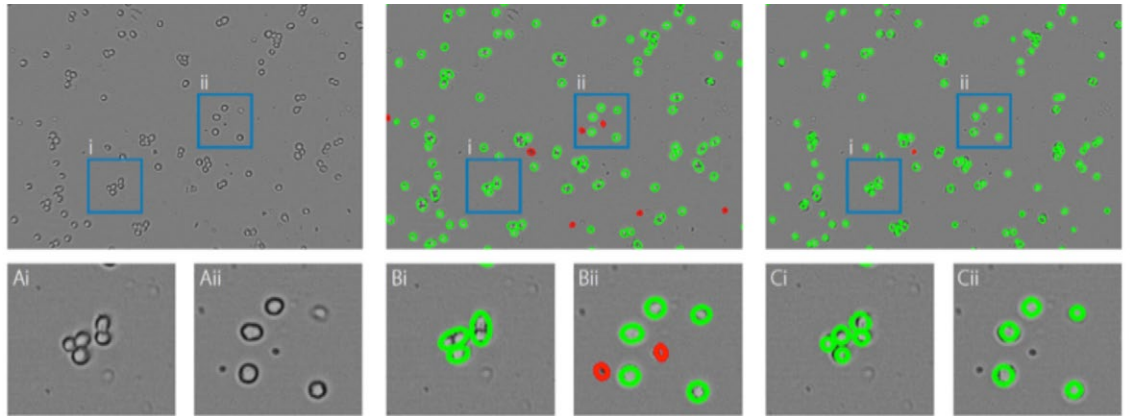


Figure 1. Improvement of the artificial intelligence algorithm of the Corning Cell Counter. A) unprocessed image. B) Results of the old algorithm, many cells in clusters are not detected properly and debris is wrongly detected as dead cells. C) Results of the new algorithm, all individual cells within clusters are detected properly and no debris is detected as dead cells. Ai-Cii) Zoomed in images of blue boxes containing examples of the improved individual cell detection (i) and dead cell detection (ii).

Another benefit of cloud-based cell counting is the ability to browse an ever expanding library of cell counts online and share results with colleagues. Scientists working in cell culture labs are familiar with the situation in which questions arise about calculations or the written-down cell concentration. Cell counts stored in the cloud are easily accessible anywhere and at any time. This enables the user to check calculations, as well as compare cell counts to see any (historic) changes in cell growth, without any doubts about the calculations.

The Future of Cloud-based Cell Counting

The functionality of the Corning® Cell Counter will continue to be improved over time, by optimizing both the software and the artificial intelligence algorithm using customer feedback and the cell counts stored in the Microsoft Azure Cloud. The artificial intelligence algorithm can be trained to recognize an improved range of cell types in the future. Furthermore, software features such as the option to combine multiple cell counts can easily be added to the Corning Cell Counter. The goal is to continue improving the Corning Cell Counter using the latest techniques in artificial intelligence and cloud computing to provide the fastest, most accurate, and versatile cloud-based cell counter as possible.

For more specific information on claims, visit the Certificates page at www.corning.com/lifesciences.

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