Problem

Low-throughput, manual colony counting

Solution

High-throughput, automated colony counting with Analytik Jena's VisionWorks Software and UVP GelStudio 12 MP

High-throughput, Multi-Colony Counting and Classification

Introduction

Any researcher using bacterial plating as a tool has likely endured the painstaking task of manually counting colonies. Depending on the scale of an experiment, this process can take hours while each colony is marked with a lab marker. Some researchers marginally improve this manual strategy by using a digital pen counter to prevent losing count, which is an all-to-common phenomenon of the former strategy. Still, both strategies mainly require manual movements by a researcher, and having to count more than one colony type can add aggravating complexity.

Fortunately, Analytik Jena has developed our VisionWorks software to accommodate researchers requiring rapid and automated colony counting, with the added ability to handle multiple colony classification. Below we demonstrate multiple colony classification using the Analytik Jena UVP GelStudio 12 MP with the Colony Count analysis tool in our VisionWorks software.

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Methods

Bacterial strains and growth conditions

For demonstration purposes, two monocultures were established using *Serratia marcescens* and *Sarcina aurantiaca* provided by Carolina Biological (Burlington, NC). *Serratia marcescens* produces the tripyrrole pigment, prodigiosin, owing to a 'prodigous' red hue. *Sarcina aurantiaca* produces an 'aurantiacus' pigment, which is responsible for its orange hue. After growing bacteria at room temperature for 16 h in non-selective LB broth, 0.5 mL of each culture was combined, vortexed, and serially diluted PBS in 10-fold dilutions. 0.1 mL of each dilution mixoculture was plated for imaging.
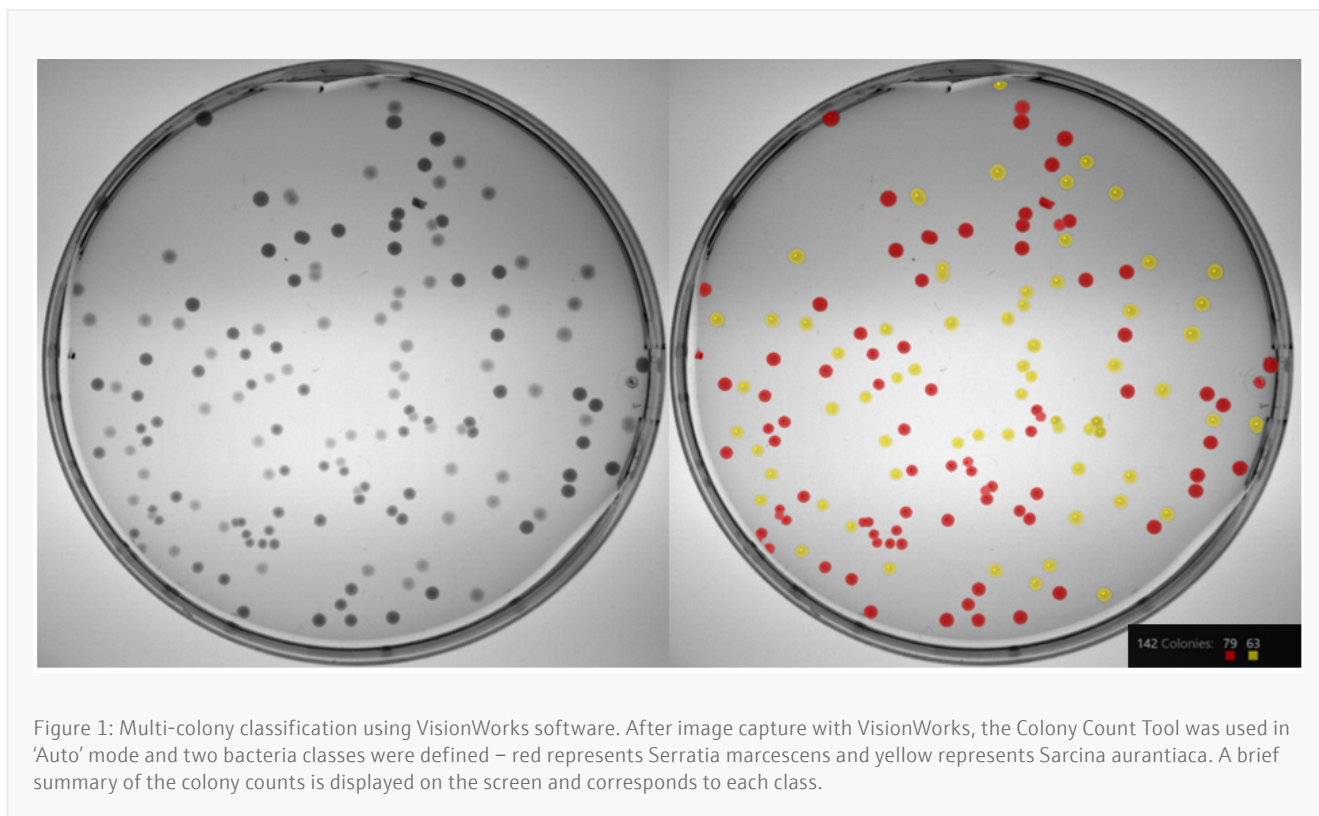
Imaging and Analysis using the UVP GelStudio 12MP and VisionWorks Software

For imaging bacteria plates, we recommend our users purchase the Visi-white™ ultraviolet converter plate (P/N 38-0191-01/38-0191-02), which can be placed on top of the UV transilluminator for white transillumination. Alternatively, a dedicated white LED transilluminator (P/N 95-0214-02) can be used – the white LED transilluminator has higher uniformity in case users want to image multiple plates or gels simultaneously. Here we used the Visi-white™ converter plate. The plate was placed on top of the converter plate, agar side up, with the lid off. For image capture, we used autoexposure and autofocusing in our VisionWorks software.

For analysis, we used the automated Colony Count analysis tool. Briefly, users navigate to the Colony Count analysis tool and select 'Auto'. The software will automatically determine the number of colonies and classes based on criteria defined by our algorithm. An overview of the results is displayed onscreen immediately after analysis. A full report can be retrieved by selecting the Report Tool.

Results and Conclusion

Using Analytik Jena's VisionWorks software, a single plate with 142 colonies of two types, was imaged, counted, and segmented in less than 10 seconds on the UVP GelStudio 12MP imager (Figure 1).

Figure 1: Multi-colony classification using VisionWorks software. After image capture with VisionWorks, the Colony Count Tool was used in 'Auto' mode and two bacteria classes were defined – red represents Serratia marcescens and yellow represents Sarcina aurantiaca. A brief summary of the colony counts is displayed on the screen and corresponds to each class.

This analysis can be scaled up since the transilluminator can accommodate two plates at a time. If users want to scale up even further, they can purchase the Analytik Jena UVP GelStudio Plus 12 MP imager. The larger format of this instrument enables users to image four plates simultaneously. At Analytik Jena, we believe researchers should spend more time tackling their exciting research questions than laboring over busy work. Let us help you leave the mundane behind by automating your workflow, to get you from question to result, more quickly.