

CLAIMS:

1. A computer-implemented method for quality control based on one or more samples of a product, the method being executed by one or more processors, and comprising:
 - receiving, by the one or more processors, sample data, the sample data being generated as digital data representation of a sample of the product;
 - providing, by the one or more processors, a set of features by processing the sample data through multiple layers of a residual network, a first layer of the residual network identifying one or more features of the sample data, and a second layer of the residual network receiving the one or more features of the first layer, and identifying one or more additional features;
 - inputting the set of features into a convolution neural network and processing, by the one or more processors, the set of features using the convolution neural network to identify a set of regions of the sample of the product;
 - determining that a number of objects in the sample is greater than a threshold number of objects, and in response, adjusting a resolution of the digital data representation of the sample of the product based on the identified set of regions by splitting the digital data representation into multiple overlapping parts;
 - processing, by the one or more processors, the set of features to identify at least one object in a region of the set of regions, and determine a type of the at least one object; and
 - selectively issuing, by the one or more processors, an alert at least partially based on the type of the at least one object, the alert indicating contamination within the sample of the product.
2. The method of claim 1, wherein the residual network is Resnet-101.
3. The method of claim 1 or 2, wherein the convolution neural network is a region-based convolution neural network.
4. The method of any of the preceding claims, further comprising providing a visual depiction of the sample within a user interface, the visual depiction comprising one or more graphical overlays indicating objects identified in the sample.

5. The method of any of the preceding claims, further comprising moving, using a robotic arm, a sample container containing the sample to a position relative to a camera, the camera generating the sample data.
6. The method of claim 5, wherein the position is located on a conveyor, which conveys the sample container to the camera for imaging of the sample within the sample container.
7. The method of any of the preceding claims, wherein an output is provided and comprises a one-hot encoded vector representative of the at least one object within the sample, and a confidence score, the confidence score representing a degree of confidence that the at least one object is of the type classified.
8. The method of any of the preceding claims, wherein the sample data comprises one or more digital images of the sample.
9. The method of any of the preceding claims, wherein the set of features is processed to identify the volume of the region, and/or the area of the region, and/or the color of the region.
10. The method of any of the preceding claims, wherein the product comprises a biological material, and/or a pharmaceutical product, and/or a food product.
11. The method of any of the preceding claims, wherein the identified region comprises a moisture colony.
12. The method of any of the preceding claims, wherein the identified object comprises bacteria.
13. A computer program comprising computer program instructions which, when executed by the one or more processors, cause the one or more processors to perform the method of one or more of claims 1 to 12.

14. A system, comprising:
one or more processors; and
a computer-readable storage device coupled to the one or more processors and having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform the method of one or more of claims 1 to 12.