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Application Documentation

Application Name	COVID-19 Detection Chest X-Ray
Version	2.0.0
Documentation Version	17.04.2020 - 1
Input Image(s)	Single Image (standard, grayscale, 8 bit) RGB images are automatically converted to grayscale images
Input Parameter(s)	None
Keywords	radiology, chest, lung, radiography, x-ray, covid-19, corona, virus
Short Description	Detection of COVID-19 cases from chest x-ray images, discriminating them from healthy and pneumonia cases.
References / Literature	Vision and Image Processing Research Group, University of Waterloo, and DarwinAI Corp., Canada Linda Wang, Zhong Qiu Lin, and Alexander Wong. <i>COVID-Net: A Tailored Deep Convolutional Neural Network Design for Detection of COVID-19 Cases from Chest X-Ray Images</i> . https://arxiv.org/pdf/2003.09871v3.pdf , 2020.
Disclaimer and License	This application provides the COVID-Net algorithm, developed by the University of Waterloo and DarwinAI Corp., Canada. The source code to this application is licensed under the GNU Affero General Public License v3.0 and publicly available from https://github.com/kmlvision/COVID-Net . For a contribution to this open-source initiative, please consider contacting the authors of the paper.
Important Information	Research Use Only! This software is not certified as a medical device and must not be used for diagnostic or therapeutic purposes.



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IKOSA® Image Analysis

You can use this or any other of our image analysis applications through your IKOSA® account. If it is not listed in the available applications, please contact your organization's IKOSA® administrator or our team at support@kmlvision.com.

Application Description

This application automatically detects (classifies) chest x-ray images as COVID-19 cases, pneumonia cases or normal (healthy) cases.

The underlying algorithm COVID-Net was developed by the Vision and Image Processing Research Group (University of Waterloo) and DarwinAI Corp., Canada. A detailed explanation of the underlying data and COVID-Net Open Source Initiative can be found in the paper "COVID-Net: A Tailored Deep Convolutional Neural Network Design for Detection of COVID-19 Cases from Chest X-Ray Images" by Linda Wang, Zhong Qiu Lin and Alexander Wong (<https://arxiv.org/abs/2003.09871v3>). The original source code and data is actively maintained and available from <https://github.com/lindawangq/COVID-Net>. The model integrated in this version 2.0.0 of the IKOSA® application is "COVID-Net Large", checkpoint "model-8485", from 14.04.2020. This application used publicly available x-ray image data from the COVIDx dataset (13,800 chest radiography images across 13,725 patient cases from three open access data repositories).

This application is still under development and at a research stage and not considered production-ready for clinical diagnosis under any circumstances.



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In the following, the requirements for an accurate analysis are given and the output of the applications is described.

Sample Data and Further Information

Sample Data: To try out this application, sample images can be downloaded here: <https://www.kmlvision.com/wp-content/uploads/2020/04/chest-xray-examples.zip>.

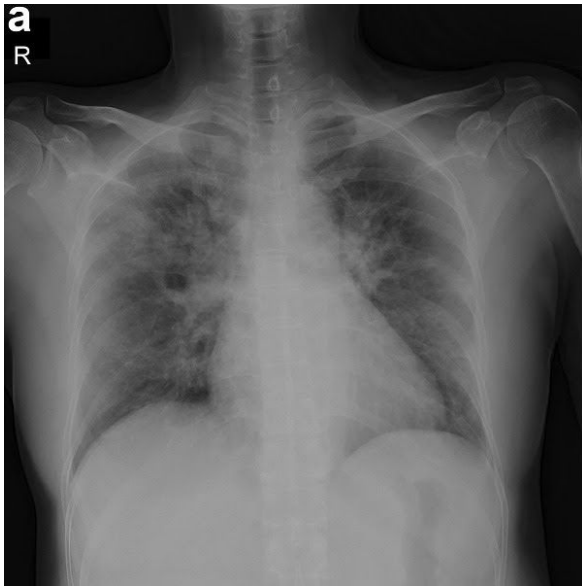
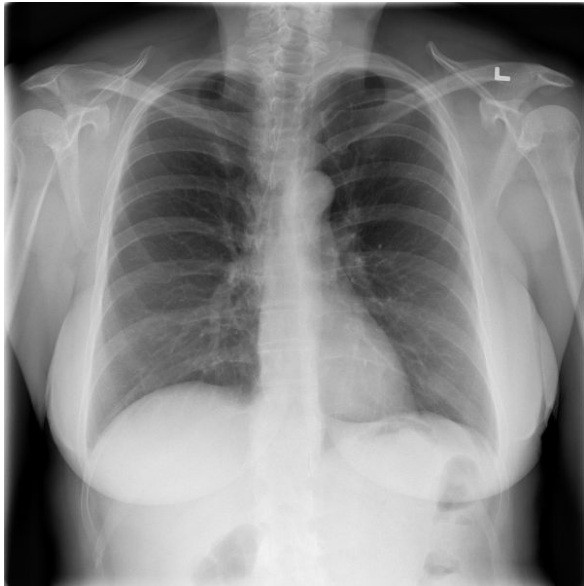
If you have any questions regarding this application or if you want to know if your specific type of images can be analyzed, please get in touch with us at support@kmlvision.com. Also, if you have requests or ideas regarding additional image analysis applications that you would require, please get in touch with us at support@kmlvision.com.

For more information, please visit www.ikosa.ai.

Requirements

Input Image(s)

Input for this application is the following image data:

No.	Image data	Type of image	Color Channels	Color Depth (per channel)	Size [Px]	Resolution [$\mu\text{m}/\text{Px}$]
#1	Single image	Standard	1 (Greyscale) 3 (RGB)	8 Bit	Min: 224 x 224 Max: 5000 x 5000	-
<p>Image Content: Chest x-ray image.</p> <p>Additional requirements:</p> <ul style="list-style-type: none"> • None <p>Examples:</p> <div style="display: flex; justify-content: space-around;">   </div> <p>Example images from https://github.com/lindawangq/COVID-Net, 07.04.2020</p>						

Input Parameter(s)

No additional input parameters are required for this application.

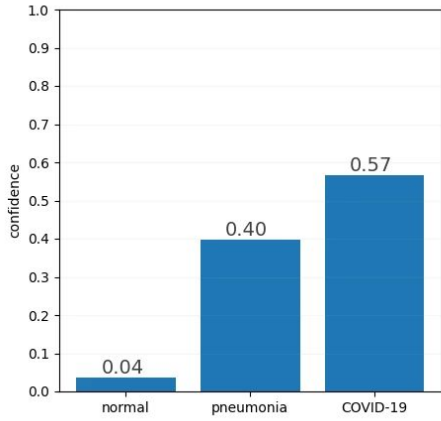
Results

Disclaimer

DO NOT USE THIS PREDICTION FOR DIAGNOSIS!

This application is not certified as a medical device and must not be used for diagnostic or therapeutic purposes.

Files

No.	File type	Content and Description
1	csv	<i>results.csv</i> : A csv file containing the results of the prediction for the input image..
2	png	<p><i>results_visualization.jpg</i>: A visualization of the results, i.e. the confidences for predicted classes as a bar chart.</p> <div style="display: flex; align-items: center;">  <ul style="list-style-type: none"> • Bars are labeled with confidences for the classes. </div>
3	txt	<i>disclaimer.txt</i> : A text file containing disclaimer information.



Description of files

File no. 1 (results.csv): Single csv-file with the following content:

Col. no.	Column name	Examples	Value range	Description
1	prediction	COVID-19	{normal, pneumonia, COVID-19}	Prediction result/Predicted class.
2	confidence_normal	0.1	0 - 1	Confidence for class being normal.
3	confidence_pneumonia	0.3	0 - 1	Confidence for class being pneumonia.
4	confidence_COVID-19	0.6	0 - 1	Confidence for class being COVID-19.