

# Diagnosis Penyakit Covid-19 Menggunakan Model Convolutional Neural Network (CNN)

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**Abstract**—Paper ini bertujuan untuk membangun sebuah model Convolutional Neural Network (CNN) yang dapat melakukan klasifikasi gambar X-Ray ke dalam dua kelas yaitu Covid dan Bukan Covid. Dataset yang digunakan adalah <http://ugm.id/MVDataset>. CNN dipilih karena kemampuannya dalam memproses data gambar yang kompleks. Selain itu, dalam laporan juga disertakan link Google Colab untuk mengakses kode program yang digunakan dalam penelitian. Hasil dari penelitian ini adalah model CNN yang dapat mengklasifikasikan gambar X-Ray ke dalam dua kelas yaitu Covid dan Bukan Covid dengan akurasi 94.5%.

**Index Terms**—COVID-19, Deep Learning, CNN, Detection, Multi-layered CNN, X-Ray

## I. INTRODUCTION

COVID-19 adalah penyakit pernapasan yang juga mirip dengan influenza. Penyakit ini ditandai dengan batuk kering, sakit kepala, kelelahan, dan demam. Sindrom Distres Pernapasan Akut (ARDS) sering menjadi penyebab kegagalan pernapasan. COVID-19 termasuk dalam Middle East Respiratory Syndrome (MERS). COVID-19 disebabkan oleh betakoronavirus SARS-CoV-2, yang mempengaruhi saluran pernapasan bawah dan menimbulkan pneumonia pada manusia. COVID-19 adalah penyakit yang cukup berbahaya bagi kehidupan manusia, sehingga diperlukan tindakan yang tepat untuk mengurangi dampak pandemi ini. Perubahan-perubahan dibutuhkan dalam sistem kesehatan masyarakat, termasuk diagnosis, penelitian, dan lainnya.

Pada saat ini, diagnosis COVID-19 dilakukan dengan menggunakan metode RT-PCR (Reverse Transcription Polymerase Chain Reaction). Metode ini membutuhkan waktu yang cukup lama untuk mendapatkan hasilnya. Selain itu, metode ini juga membutuhkan alat yang cukup mahal. Oleh karena itu, dibutuhkan metode yang lebih cepat dan lebih murah untuk mendeteksi COVID-19. Salah satu metode yang dapat digunakan adalah dengan menggunakan gambar X-Ray. Gambar X-Ray dapat digunakan untuk mendeteksi COVID-19 karena gambar X-Ray dapat menunjukkan adanya pneumonia pada paru-paru.

Deep learning merupakan salah satu teknik dalam machine learning yang menggunakan model neural network dengan banyak layer untuk mempelajari fitur-fitur yang kompleks dari data dan melakukan prediksi atau klasifikasi dengan akurasi yang tinggi. Salah satu jenis neural network yang populer

dalam deep learning adalah convolutional neural network (CNN).

Menurut LeCun et al. (2015), CNN merupakan jenis neural network yang dirancang khusus untuk mengolah data dengan struktur grid atau matriks, seperti gambar. CNN menggunakan konvolusi untuk mempelajari fitur-fitur pada data dan pooling untuk mengurangi dimensi data, sehingga mampu menangani input yang besar dan kompleks.

CNN banyak digunakan dalam berbagai aplikasi seperti pengenalan wajah, pengenalan tulisan tangan, klasifikasi gambar, dan lain sebagainya. Keunggulan dari CNN adalah kemampuannya untuk mempelajari fitur-fitur dari data secara otomatis, tanpa perlu fitur ekstraksi manual. Hal ini membuat CNN menjadi sangat efektif dan efisien dalam mengolah data yang kompleks.

Pada penelitian ini, CNN digunakan untuk mengklasifikasikan gambar X-Ray ke dalam dua kelas yaitu kelas yang terdiagnosis dengan Covid-19 dan kelas yang normal. Penelitian ini bertujuan untuk mencari model CNN yang optimal untuk deteksi atau diagnosis Covid-19.

## II. METHODOLOGY

### A. Dataset

Pada penelitian ini awalnya menggunakan dataset yang digunakan adalah dataset dari Joseph Paul Cohen, Paul Morrison dan Lan Dao yang berisi 156 gambar X-Ray paru-paru. Namun untuk membangun model CNN yang lebih baik, dataset tersebut ditambahkan dengan dataset dari Muhammad E. H. Chowdhury et al. yang berisi 13964 gambar.

## III. EASE OF USE

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The IEEEtran class file is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

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Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections IV-A–IV-E below for more information on proofreading, spelling and grammar.

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##### A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, ac, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

##### B. Units

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- Use a zero before decimal points: “0.25”, not “.25”. Use “cm<sup>3</sup>”, not “cc”).

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Number equations consecutively. To make your equations more compact, you may use the solidus ( / ), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \gamma \quad (1)$$

Be sure that the symbols in your equation have been defined before or immediately following the equation. Use “(1)”, not “Eq. (1)” or “equation (1)”, except at the beginning of a sentence: “Equation (1) is . . .”

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Please use “soft” (e.g., `\eqref{Eq}`) cross references instead of “hard” references (e.g., (1)). That will make it possible to combine sections, add equations, or change the order of figures or citations without having to go through the file line by line.

Please don’t use the `\eqnarray` equation environment. Use `\align` or `\IEEEeqnarray` instead. The `\eqnarray` environment leaves unsightly spaces around relation symbols.

Please note that the `\subequations` environment in  $\LaTeX$  will increment the main equation counter even when there are no equation numbers displayed. If you forget that, you might write an article in which the equation numbers skip from (17) to (20), causing the copy editors to wonder if you’ve discovered a new method of counting.

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Do not use `\nonumber` inside the `\array` environment. It will not stop equation numbers inside `\array` (there won’t be any anyway) and it might stop a wanted equation number in the surrounding equation.

##### E. Some Common Mistakes

- The word “data” is plural, not singular.
- The subscript for the permeability of vacuum  $\mu_0$ , and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
- In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
- A graph within a graph is an “inset”, not an “insert”. The word alternatively is preferred to the word “alternately” (unless you really mean something that alternates).
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- In your paper title, if the words “that uses” can accurately replace the word “using”, capitalize the “u”; if not, keep using lower-cased.
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- Do not confuse “imply” and “infer”.
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- There is no period after the “et” in the Latin abbreviation “et al.”.
- The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

An excellent style manual for science writers is [7].

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Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

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TABLE I  
TABLE TYPE STYLES

Table Head	Table Column Head		
	Table column subhead	Subhead	Subhead
copy	More table copy <sup>a</sup>		

<sup>a</sup>Sample of a Table footnote.

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when



Fig. 1. Example of a figure caption.

writing Figure axis labels to avoid confusing the reader. As an example, write the quantity “Magnetization”, or “Magnetization, M”, not just “M”. If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write “Magnetization (A/m)” or “Magnetization {A[m(1)]}”, not just “A/m”. Do not label axes with a ratio of quantities and units. For example, write “Temperature (K)”, not “Temperature/K”.

#### ACKNOWLEDGMENT

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Please number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use “Ref. [3]” or “reference [3]” except at the beginning of a sentence: “Reference [3] was the first ...”

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Unless there are six authors or more give all authors’ names; do not use “et al.”. Papers that have not been published, even if they have been submitted for publication, should be cited as “unpublished” [4]. Papers that have been accepted for publication should be cited as “in press” [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

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