

# DIAGNOSTIC SUPPORT OF SKIN LESION CLASSIFICATION USING CNN AND SOFT ATTENTION

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**Abstract:** Today, the rapid development of industrial zones leads to an increasing incidence of skin diseases because of polluted air. According to a report by the American Cancer Society, it is estimated that in 2022 there will be about 100,000 people suffered from skin cancer and more than 7600 of these people will not survive. In the context that doctors at provincial hospitals and health facilities are overloaded, doctors at lower levels have lack of experience, having a tool to support doctors in the process of diagnosing skin diseases quickly and accurately is essential. Along with the strong development of artificial intelligence technologies, many solutions and tools to support the diagnosis of skin diseases have been researched and developed. These include DenseNet, InceptionNet, ResNet, NasNet, SeNet, EfficientNet, VGGNet. In this study, another approach to build tools to aid in the diagnosis of skin pathologies is proposed. SOTA (state of the art) models DenseNet, InceptionNet, ResNet, NasNet, MobileNet combined with Soft-Attention are used as backbone. In addition, personal information such as age and gender are also used. In addition, a new loss function that takes into account the imbalance of the data is also proposed. Experimental results on dataset HAM10000 show that using InceptionResNetV2 with Soft-Attention and new loss function gives 90 percent accuracy, mean of precision, f1-score, recall-score, and aucscores of 0.81, 0.81, 0.82, and 0.989, respectively, are improvements compared to published indexes. Besides, using MobileNetV3Large combined with Soft-Attention and new loss function, even though the number of parameters is 11 times less, the number of floors is 4 times less, it achieves 86 percent accuracy and 30 times faster diagnosis.

**Keywords:** AI-enabled computer-aid diagnosis, Diagnosis, Skin Sancer, Skin Lesion Classification, Artificial Intelligence, Deep Learning, Machine Learning)

**Citation:** Do, K. Title. *Journal Not Specified* **2022**, *1*, 0. <https://doi.org/>

Received:

Accepted:

Published:

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#### 3.1.1. Subsubsection

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- Second bullet;
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Title 1	Title 2	Title 3
Entry 1	Data	Data
Entry 2	Data	Data

**Table 2.** This is a wide table.

Title 1	Title 2	Title 3	Title 4
Entry 1	Data	Data	Data
Entry 2	Data	Data	Data <sup>1</sup>

<sup>1</sup> This is a table footnote.

Text.

Text.

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3.3. *Formatting of Mathematical Components*

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This is the example 1 of equation:

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$$a = 1,$$

(1)

the text following an equation need not be a new paragraph. Please punctuate equations as regular text.

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This is the example 2 of equation:

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$$a = b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z$$

(2)



**Figure 2.** This is a wide figure.

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## Abbreviations

The following abbreviations are used in this manuscript:

MDPI	Multidisciplinary Digital Publishing Institute
DOAJ	Directory of open access journals
TLA	Three letter acronym
LD	Linear dichroism

## Appendix A

### Appendix A.1

The appendix is an optional section that can contain details and data supplemental to the main text—for example, explanations of experimental details that would disrupt the

flow of the main text but nonetheless remain crucial to understanding and reproducing the research shown; figures of replicates for experiments of which representative data are shown in the main text can be added here if brief, or as Supplementary Data. Mathematical proofs of results not central to the paper can be added as an appendix.

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Title 1	Title 2	Title 3
Entry 1	Data	Data
Entry 2	Data	Data

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**References**

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