

【CLAIMS】

[Claim 1]

A diagnosis assistant system for assisting diagnosis of a plurality of diseases

5 based on a fundus image, comprising:

a fundus image obtaining unit configured to acquire a target fundus image which is a basis for acquiring diagnosis assistance information on a subject;

a first processing unit configured to, for the target fundus image, obtain a first result related to a first finding of the subject using a first neural network model,

10 wherein the first neural network model is trained on the basis of a first fundus image set;

a second processing unit configured to, for the target fundus image, obtain a second result related to a second finding of the subject using a second neural network model, wherein the second neural network model is trained on the basis of a

15 second fundus image set which is at least partially different from the first fundus image set;

a third processing unit configured to determine, on the basis of the first result and the second result, a diagnostic information on the subject; and

a diagnostic information output unit configured to provide the determined
20 diagnostic information to a user;

wherein, the first finding and the second finding is used for diagnosing

different diseases, and wherein the first finding is related to an eye disease and the first result indicates whether the subject is normal or not regarding the eye disease, and the second finding is related to a systemic disease and the second result indicates whether the subject is normal or not regarding the systemic disease.

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[Claim 2]

The diagnosis assistant system of claim 1, wherein:

the first neural network model is trained to classify an input fundus image into one of normal label and an abnormal label regarding the first finding, and

10 the first processing unit obtains the first result by classifying the target fundus image into one of the normal label or the abnormal label.

[Claim 3]

The diagnosis assistant system of claim 1, wherein:

15 the third processing unit determines whether the diagnostic information regarding the target fundus image is a normal information or an abnormal information, considering the first result and the second result together.

[Claim 4]

The diagnosis assistant system of claim 3 wherein:

20 the third processing unit determines the diagnostic information of the subject by assigning priority on the abnormal label so that a diagnosis accuracy is

improved.

[Claim 5]

The diagnosis assistant system of claim 1,

wherein when the first label is a normal label of the first finding and the
5 second label is a normal label of the second finding, the third processing unit
determines the diagnostic information normal, and

wherein when the first label is not the normal label of the first finding or
the second label is not the normal label of the second finding, the third processing
unit determines the diagnostic information abnormal.

10 [Claim 6]

A diagnosis assistant system for assisting diagnosis of a plurality of
diseases based on a fundus image, comprising:

a fundus image obtaining unit configured to acquire a target fundus image
which is a basis for acquiring diagnosis assistance information on a subject;

15 a first processing unit configured to, for the target fundus image, obtain a
first result related to a first finding of the subject using a first neural network model
wherein the first neural network model is trained on the basis of a first fundus image
set;

a second processing unit configured to, for the target fundus image, obtain
20 a second result related to a second finding of the subject using a second neural

network model, wherein the second neural network model is trained on the basis of a second fundus image set which is at least partially different from the first fundus image set;

5 a third processing unit configured to determine, on the basis of the first result and the second result, a diagnostic information on the subject; and

a diagnostic information output unit configured to provide the determined diagnostic information to a user, wherein, the first finding and the second finding is used for diagnosing different diseases, and

10 wherein the first finding is related to a first eye disease and the first result indicates whether the subject is normal or not regarding the first eye disease, and the second finding is related to a second eye disease and the second result indicates whether the subject is normal or not regarding the second eye disease.

[Claim 7]

The diagnosis assistant system of claim 1 wherein:

15 the first neural network model includes a first sub neural network model and a second sub neural network model and

the first result is determined by considering a first prediction value predicted by the first sub neural network model and a second prediction value predicted by the second sub neural network model together.

20 [Claim 8]

The diagnosis assistant system of claim 1 wherein:

the first processing unit obtains a CAM(class activation map) related to the first label via the first neural network model and

the diagnostic information output unit output an image of the CAM.

5 [Claim 9]

The diagnosis assistant system of claim 6 wherein:

the first processing unit obtains a CAM(class activation map) related to the first label via the first neural network model and

the diagnostic information output unit output an image of the CAM.

10 [Claim 10]

The diagnosis assistant system of claim 6, wherein:

the third processing unit determines whether the diagnostic information regarding the target fundus image is a normal information or an abnormal information, considering the first result and the second result together.

15 [Claim 11]

The diagnosis assistant system of claim 10, wherein:

the third processing unit determines the diagnostic information of the subject by assigning priority on the abnormal label so that a diagnosis accuracy is improved.

20 [Claim 12]

The diagnosis assistant system of claim 10,

wherein when the first label is a normal label of the first finding and the second label is a normal label of the second finding, the third processing unit determines the diagnostic information normal, and

5 wherein when the first label is not the normal label of the first finding or the second label is not the normal label of the second finding, the third processing unit determines the diagnostic information abnormal.

[Claim 13]

The diagnosis assistant system of claim 6, wherein:

10 the first neural network model includes a first sub neural network model and a second sub neural network model and

the first result is determined by considering a first prediction value predicted by the first sub neural network model and a second prediction value predicted by the second sub neural network model together.

15 [Claim 14]

The diagnosis assistant system of claim 6, wherein:

the first processing unit obtains a CAM(class activation map) related to the first label via the first neural network model and the diagnostic information output unit output an image of the CAM.

20 [Claim 15]

A diagnosis assistant system for assisting diagnosis of a plurality of diseases based on a fundus image, comprising:

a fundus image obtaining unit configured to acquire a target fundus image which is a basis for acquiring diagnosis assistance information on a subject;

5 a first processing unit configured to, for the target fundus image, obtain a first result related to a first finding of the subject using a first neural network model wherein the first neural network model is trained on the basis of a first fundus image set;

a second processing unit configured to, for the target fundus image, obtain
10 a second result related to a second finding of the subject using a second neural network model, wherein the second neural network model is trained on the basis of a second fundus image set which is at least partially different from the first fundus image set;

a third processing unit configured to determine, on the basis of the first
15 result and the second result, a diagnostic information on the subject;

a diagnostic information output unit configured to provide the determined diagnostic information to a user; and

a fourth processing unit configured to obtain a quality information of the target fundus image,

20 wherein, the first finding and the second finding is used for diagnosing different diseases, and

wherein, the diagnostic information output unit outputs the quality information of the target fundus image obtained by the fourth processing unit.

[Claim 16]

The diagnosis assistant system of claim 15, wherein:

5 the first neural network model is trained to classify an input fundus image into one of normal label and an abnormal label regarding the first finding, and

 the first processing unit obtains the first result by classifying the target fundus image into one of the normal label or the abnormal label.

[Claim 17]

10 The diagnosis assistant system of claim 16, wherein:

 the third processing unit determines whether the diagnostic information regarding the target fundus image is a normal information or an abnormal information, considering the first result and the second result together.

[Claim 18]

15 The diagnosis assistant system of claim 17, wherein:

 the third processing unit determines the diagnostic information of the subject by assigning priority on the abnormal label so that a diagnosis accuracy is improved.

[Claim 19]

20 The diagnosis assistant system of claim 15,

wherein when the first label is a normal label of the first finding and the second label is a normal label of the second finding, the third processing unit determines the diagnostic information normal, and

wherein when the first label is not the normal label of the first finding or
5 the second label is not the normal label of the second finding, the third processing unit determines the diagnostic information abnormal.

[Claim 20]

The diagnosis assistant system of claim 15,

wherein when the quality information of the target fundus image is
10 determined to lower than a predetermined quality level in the fourth processing unit,
the diagnostic information output unit provides an information indicating that the quality information of the target fundus image is lower than the predetermined quality level.