AN EYE SCREENING METHOD USING A MODEL BUILD USING AN AI ENGINE TRAINED WITH SPECIALIST-GRADED RETINAL FUNDUS IMAGES

Technical Field

The present disclosure relates to an eye screening method. Particularly, the present disclosure relates to an eye screening method that uses an AI Engine trained with specialist-graded retinal fundus images to differentiate between not-normal eyes and normal eyes.

Background New advances in artificial intelligence are available for pattern recognition. An artificial intelligence engine (AI Engine) can be trained to classify images through a training cycle using pre-graded images. This trained AI Engine can then create a model for classifying new un-graded images.

An AI Engine, implemented in software or firmware, can be a run on a high-speed computing device such as a server. Example AI Engines include a support vector machine (SVM), a gradient boosting machine (GBM), a Random Forest and a convolutional neural network (CNN). In artificial intelligence, model-based reasoning refers to an inference method used in expert systems based on a model of the physical world. With this approach, the main focus of application development is developing the model. Then at run time, the AI Engine combines this model knowledge with observed data to derive conclusions such as a classification and/or prediction.

In machine learning, SVMs are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier (although methods such as Platt scaling exist to use SVM in a probabilistic classification setting). An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall.

GBM is a machine learning technique for regression and classification problems, which produces a model in the form of an ensemble of weak models, typically decision trees. It builds the model in a stage-wise fashion like other boosting methods do, and it generalizes them by allowing optimization of an arbitrary differentiable loss function.

Random Forests are an ensemble learning method for classification, regression and other tasks, that operate by constructing a multitude of decision trees at training time and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees to create models. Random decision forests correct for decision trees' habit of overfitting to their training set.

In machine learning, CNN is a type of feed-forward artificial neural network in which the connectivity pattern between its neurons is inspired by the organization of the animal visual cortex to create models. Individual cortical neurons respond to stimuli in a restricted region of space known as the receptive field. The receptive fields of different neurons partially overlap such that they tile the visual field. The response of an individual neuron to stimuli within its receptive field can be approximated mathematically by a convolution operation. Convolutional networks were inspired by biological processes and are variations of multilayer perceptrons designed to use minimal amounts of pre-processing. They have wide applications in image and video recognition, recommender systems and natural language processing.

Leading causes of blindness and visual impairment include diseases such as cataract (47.9%), glaucoma (12.3%), age-related macular degeneration (AMD) (8.7%), corneal opacities (5.1%), diabetic retinopathy (4.8%). The prevalence of such diseases is on the rise in part due to sedentary lifestyles and an aging population which has brought about many metabolic diseases such as diabetes, high blood pressure (hypertension), high cholesterol (hyperlipidemia), and age related diseases which are linked to the aforementioned eye diseases. Progression to blindness is largely preventable if timely detection and subsequent treatment is administered.

Cataract is an eye disease that causes blurry vision or fog like vision due to the opacification of the lens inside the patient eye. Cataract primarily occurs in the eyes of older individuals since it is believed that the formation of cataract is due to deterioration of the protein fibres in

the lens. This leads to the formation of clumps which produces cloud areas in the lens. Cataract can lead to permanent loss vision if it is untreated early.

Based on 2010 survey, 45.9 million people worldwide have their vision impaired due to cataract. Among the 45.9 million people, 10.8 million of them were blind due to cataract. In Asia alone, 31.5 million people were suffering from cataract and 7.27 million people lost their vision due to cataract. In 2010 it was also recorded that 2.5 million people in china were suffering from cataract and this was expected to increase by 400 thousand people annually. This was largely due to a large population of elderly with age of 65 years and above.

Glaucoma refers to a group of eye diseases which refers to the slow deterioration of optic nerve that is located at the back of the eye. This is often due to the build-up of fluid pressure inside the eye. This results in obstruction of the circulation of the fluid called the aqueous humour that would normally flow naturally out from the eye. This blockage can occur due to genetic factors or chemical injury to the eye.

There are several types of glaucoma; open-angle glaucoma, angle-closure glaucoma and congenital glaucoma.

Open-angle glaucoma (OAG) is a common type of glaucoma. This occurs when the angle of the eye where the iris meets the cornea normal however, impairment to the eye's drainage capability leads to fluid build-up which causes increase in internal pressure while leads optic nerve damage.

Angle-closure glaucoma (ACG) on the other hand is uncommon. This occurs when there is a sudden increase in internal pressure of the eye due to the angle between the iris and cornea being too narrow, thus interrupting the drainage of the fluids.

Congenital glaucoma is a rare form of glaucoma which occurs as a result of incorrect or incomplete development of the eye's drainage canals during the prenatal period.

As evident from its name, diabetic retinopathy (DR) is a condition that only occurs only in people who are diabetic. This disease causes progressive damage to the blood vessels in the retina over time. This occurs primarily due to the high amount of sugar that is present in a

diabetic's blood which causes tiny blood vessels in the retina to leak fluid or bleed and leads to progressive damage to eye vasculature. This leads to visual impairment such as cloudy or blurred vision. In advanced stages of the disease, neovascularisation occurs which further damages retina cells and if left untreated may lead to blindness.

Diabetic retinopathy disease progression is categorised into 4 different stages; mild, moderate, severe and proliferative . In the first stage (mild), there is swelling in the tiny blood vessel of the retina. In the second stage (moderate), the blood vessels in the retina continue to swell, disrupting its structure leading to the blood vessels to lose their ability to transport blood. During this stage, it causes changes to the shape of the retina which may lead to diabetic macular oedema (DME). In the third stage (severe), most of the blood vessels is blocked leading to decrease the blood supply to the retina. As the retina of deprived of the blood supply, growth factor release to neovascularisation. During the last stage (proliferative), the continued release of growth factors, new fragile blood vessels grows that is most likely to bleed and leak and this will lead to retinal detachment.

From clinical studies in 2010, it was estimated that in the world that more than 371 million adults were affected by diabetes [9, 14]. In Asia alone, it was estimated that 222.6 million adults were affected by diabetes [8, 9, 14]. Countries such as India and China contribute the highest to the number at 65.1 million and 113.9 million people were affected from diabetes. Moreover, out of the 371 million adults, 126.6 million suffers from DR [9, 14]. In China alone, 56.15 million people suffer from DR [9, 14]. This has been a global epidemic and it keeps increasing annually.

In 2010, it was indicated that worldwide a total of 60.4 million people suffered from glaucoma with 44.7 million from OAG and 15.7 million from ACG [5]. In Asian countries including China, India, Japan and SEA, 34.4 million people were suffering from glaucoma and 20.9 million of them suffer OAG and 13.5 million with ACG respectively.

Timely detection has proven to be elusive especially in developing countries with large rural populations scattered over a large geographical area in countries such as China, Russia and India.

In 2010, International Council of Ophthalmology indicated that only a total of 32 million ophthalmologists worldwide. This translates to a ratio is 6.4 thousand ophthalmologists to 1 million people. However, based from vision 2020 studies, South-east Asia has a total of 1.63 billion people but is only served by 13.3 thousand ophthalmologists or a ratio of 1 ophthalmologist to 122 thousand people. This strongly suggests that more ophthalmologists are required particularly in developing countries.

Notwithstanding the frank lack of ophthalmologists, the population in rural and remote areas face further challenges with respect to accessibility to eye care as ophthalmologists tend to be concentrated in major cities. This necessitates travel to major cities and sometimes queue for days to see an ophthalmologist in a large city hospital.

According to statistics from the Singapore National Eye Centre (SNEC), even in diabetics, only one in three patients who go for an eye check-up actually need the urgent attention of an ophthalmologist. This implies that ophthalmologists are spending most of their time and resources examining patients who are not in actual need of urgent medical attention which could be better spent examination patients in need of treatment.

Therefore, there is a need for an inexpensive and more convenient means of evaluating patient eyes, especially in rural or remote areas, such that patients with healthy eyes can forego unnecessary trips to an ophthalmologists and patients with potentially unhealthy eyes can be directed to additional eye screening or treatment.

Summary

A primary embodiment of the invention is a method of eye screening comprising the steps of: (a) loading a plurality of specialist-graded retinal fundus images into a database; (b) training an AI Engine to operate on the specialist-graded retinal fundus images; (c) building a model from the specialist-graded retinal fundus images using the AI Engine to differentiate between only one of a normal classification and a not-normal classification; (d) receiving from a web-server a plurality of patient files, (e) loading the patient files into the database; (f) differentiating with use of the model the retinal fundus images of each patient file between only one of the normal classification and the not-normal classification; and (g) updating each patient file to classify the retinal fundus images as only one of the normal classification and the not-normal classification. The AI Engine comprises at least one algorithm or a

combination of algorithms selected from machine learning algorithms and deep learning algorithms. The AI Engine comprise at least one of a support vector machine (SVM), a gradient boosting machine (GBM), a Random Forest and a convolutional neural network (CNN). Each patient file includes a plurality of patient data and retinal fundus images that are un-graded.

In an alternative of the first embodiment, the step of differentiating may further comprise use of at least one of the following eye criteria: (a) a plurality of retinal vessels in focus; (b) a cup to disc ratio <0.3; and (c) an absence of at least one of: (i) a visible media opacity; (ii) a diabetic retinopathy indicator including at least one of a blot haemorrhage, a micro-aneurysm and a hard exudate; (iii) a diabetic maculopathy; (iv) a macula oedema; (v) an exudate near a macula; (vi) an exudate on a macula; (vii) a laser scar; (viii) cataract; (ix) glaucoma; (x) diabetic retinopathy; and (xi) an age related macular degeneration including at least one of a multiple large drusen, a geographic atrophy with distinct areas of hypopigmentation and a choroidal neovascular membrane, wherein the age related macular degeneration is indicative of at least one of an atrophic, a neovascular and an exudative. At least one of the eye criteria may be excluded.

In further alternatives of the first embodiment: (i) the specialist-graded retinal fundus images can be an ophthalmologist-graded retinal fundus image; (ii) the method may further comprise the step of scheduling a routine retesting of a patient's eyes for at least one patient file not having any retinal fundus image classified with the not-normal classification; (iii) the method may further comprise the step of scheduling an appointment with an ophthalmologist for at least one patient file which has at least one retinal fundus image classified with the not-normal classification; (iv) the method may further comprise the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the normal classification; (v) the method may further comprise the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the not-normal classification; (vi) each retinal fundus image may comprise at least 3000*2000 pixels, has a fundus field of at least 45 degrees and has a pixel resolution of at least 150 dpi; (vii) the retinal fundus images of at least one patient file may be taken with a portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via a wireless data transmitter connectable to the portable fundus camera; (viii) the retinal fundus images of at least one patient file may be taken with a

portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via the portable fundus camera, wherein the fundus camera may include a wireless data transmitter; (ix) the web-server may host at least one national portal and at least one worldwide portal; or (x) at least one patient file may be uploaded to the web-server via at least one portable application.

By creating an inexpensive and convenient means for evaluating patient eyes, the invention has the potential to drastically reduce preventable blindness and visual impairment worldwide in developing and developed countries. With this invention, patients with healthy eyes can forego unnecessary trips to an ophthalmologists and patients with potentially unhealthy eyes can be directed to additional eye screening or treatment. Ophthalmologists can spend less of their time and resources examining patients who are not in actual need of urgent medical attention which can be better spent examination patients in need of treatment.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a diagram of the model building in an embodiment of the invention.

FIG. 2 is a diagram of the retinal fundus image loading in an embodiment of the invention.

FIG. 3 is a diagram of the classification of retinal fundus images in an embodiment of the invention.

FIG. 4 is a flowchart of the steps of the model building in an embodiment of the invention.

FIG. 5 is a flowchart of the steps of the retinal fundus image loading in an embodiment of the invention.

FIG. 6 is a flowchart of the steps of the classification of retinal fundus images in an embodiment of the invention.

FIG. 7 is an illustration of communication paths through a portal in an embodiment of the invention.

Detailed Description

In the present disclosure, depiction of a given element or consideration or use of a particular element number in a particular figure or a reference thereto in corresponding descriptive material can encompass the same, an equivalent, or an analogous element or element number identified in another figure or descriptive material associated therewith. While aspects of the present disclosure will be described in conjunction with the embodiments provided herein, it will be understood that they are not intended to limit the present disclosure to these embodiments. On the contrary, the present disclosure is intended to cover alternatives, modifications and equivalents to the embodiments described herein, which are included within the scope of the present disclosure as defined by the appended claims. Furthermore, in the following detailed description, specific details are set forth in order to provide a thorough understanding of the present disclosure. However, it will be recognized by an individual having ordinary skill in the art, i.e. a skilled person, that the present disclosure may be practiced without specific details, and/or with multiple details arising from combinations of aspects of particular embodiments. In a number of instances, well-known systems, methods, procedures, and components have not been described in detail as not to unnecessarily obscure aspects of the embodiments of the present disclosure. Unless specified otherwise, the terms "comprising," "comprise," "including" and "include" used herein, and grammatical variants thereof, are intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, un-recited elements. The terms "transmitting," "receiving," or "loading" used herein, and grammatical variants thereof, are intended to represent a linking of two items either directly together or linking them indirectly together electrically or wirelessly through the passage of other components such as routers, internet, networks and servers.

FIG. 1 is a diagram of the model building 1-100 in an embodiment of the invention. The diagram of the model building 1-100 illustrates specialist-graded retinal fundus images 1-01 loading into a database that holds the specialist-graded retinal fundus images 1-02, the training of the AI Engine 1-03 using the specialist-graded retinal fundus images 1-01, the building of the model 1-04 using AI Engine 1-03.

FIG. 2 is a diagram of the retinal fundus image loading 2-00 in an embodiment of the invention. The diagram of the retinal fundus image 2-00 illustrates: a portable fundus camera taking retinal fundus images 2-01 and combining them with patient data to create

patient files, creating patient files with retinal fundus images and patient data 2-02, transmitting with a cell phone patient files 2-03 to a cell tower connected to the web 2-04, receiving the patient files at a web-server 2-05, and loading the patient files into a database holding the patient files 2-06.

FIG. 3 is a diagram of the classification of retinal fundus images 3-00 in an embodiment of the invention. The diagram of the classification of retinal fundus images 3-00 illustrates: a database holding patient files 2-06 that are differentiated using the model 1-04 and a patient file with retinal fundus image classified as not normal 3-01 and a patient file with retinal fundus images classified as normal 3-02. Note that the patient files are updated by the model 1-04.

FIG. 4 is a flowchart of the steps of the model building 4-00 in an embodiment of the invention. The flowchart of the steps of the model building 4-00 illustrates the steps of: ...

- 4-01 Load plurality of specialist-graded retinal fundus images into a database.
- 4-02 Train an AI Engine to operate on the specialist-graded retinal fundus images.
- 4-03 Build a model from the specialist-graded retinal fundus images using the AI Engine.
- 4-04 Further train the AI Engine based upon ophthalmologist grading of the retinal fundus images of patient files with normal and not-normal classification.

FIG. 5 is a flowchart of the steps of the retinal fundus image loading 5-00 in an embodiment of the invention. The flowchart of the steps of the retinal fundus image 5-00 illustrates the steps of: ..

- 5-01 Take retinal fundus images of patients' retina with a portable fundus camera in the field.
- 5-02 Create patient files with patient data and retinal fundus images of patients' retina.
- 5-03 Transmit patient files via a wireless data transmitter to a web-server via a national or worldwide portal.
- 5-04 Receive from the web-server a plurality of patient files.
- 5-05 Load the patient files into a database.

FIG. 6 is a flowchart of the steps of the classification of retinal fundus images 6-00 in an embodiment of the invention.The flowchart of the steps of the classification 6-00 illustrates the steps of:

- 6-01 Differentiate retinal fundus images between the normal classification and the not-normal classification using the model created by an AI Engine.
- 6-02 Update the patient files to classify the retinal fundus images with either normal or not-normal classification.
- 6-03 For each patient file with not-normal classification, either schedule routine retesting of patient's eyes or schedule an appointment with an ophthalmologist.

FIG. 7 is an illustration of communication paths through a portal 7-00 in an embodiment of the invention. As illustrated, the communication paths through a portal 7-00 include communication to and from the portal through laptops, smart phones, tablets, computers and optical centres. The optical centres aggregate communication from patients in countries and villages.

A primary embodiment of the invention is a method of eye screening comprising the steps of: (a) loading a plurality of specialist-graded retinal fundus images into a database; (b) training an AI Engine to operate on the specialist-graded retinal fundus images; (c) building a model from the specialist-graded retinal fundus images using the AI Engine to differentiate between only one of a normal classification and a not-normal classification; (d) receiving from a web-server a plurality of patient files, (e) loading the patient files into the database; (f) differentiating with use of the model the retinal fundus images of each patient file between only one of the normal classification and the not-normal classification; and (g) updating each patient file to classify the retinal fundus images as only one of the normal classification and the not-normal classification. The AI Engine comprises at least one algorithm or a combination of algorithms selected from machine learning algorithms and deep learning algorithms. The AI Engine comprise at least one of a support vector machine (SVM), a gradient boosting machine (GBM), a Random Forest and a convolutional neural network (CNN). Each patient file includes a plurality of patient data and retinal fundus images that are un-graded.

During the differentiating step the quantity retinal fundus images present in the patient file may be 2-4.

In an alternative of the first embodiment, the step of differentiating may further comprise use of at least one of the following eye criteria: (a) a plurality of retinal vessels in focus; (b) a cup to disc ratio <0.3; and (c) an absence of at least one of: (i) a visible media opacity; (ii) a diabetic retinopathy indicator including at least one of a blot haemorrhage, a micro-aneurysm and a hard exudate; (iii) a diabetic maculopathy; (iv) a macula oedema; (v) an exudate near a macula; (vi) an exudate on a macula; (vii) a laser scar; (viii) cataract; (ix) glaucoma; (x) diabetic retinopathy; and (xi) an age related macular degeneration including at least one of a multiple large drusen, a geographic atrophy with distinct areas of hypopigmentation and a choroidal neovascular membrane, wherein the age related macular degeneration is indicative of at least one of an atrophic, a neovascular and an exudative. At least one of the eye criteria may be excluded.

The purpose of excluding one or more eye criteria is to tailor the screening process to the needs and resources available in a given country.

In further alternatives of the first embodiment: (i) the specialist-graded retinal fundus images can be an ophthalmologist-graded retinal fundus image; (ii) the method may further comprise the step of scheduling a routine retesting of a patient's eyes for at least one patient file not having any retinal fundus image classified with the not-normal classification; (iii) the method may further comprise the step of scheduling an appointment with an ophthalmologist for at least one patient file which has at least one retinal fundus image classified with the not-normal classification; (iv) the method may further comprise the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the normal classification; (v) the method may further comprise the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the not-normal classification; (vi) each retinal fundus image may comprise at least 3000*2000 pixels, has a fundus field of at least 45 degrees and has a pixel resolution of at least 150 dpi; (vii) the retinal fundus images of at least one patient file may be taken with a portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via a wireless data transmitter connectable to the portable fundus camera; (viii) the retinal fundus images of at least one patient file may be taken with a

portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via the portable fundus camera, wherein the fundus camera may include a wireless data transmitter; (ix) the web-server may host at least one national portal and at least one worldwide portal; or (x) at least one patient file may be uploaded to the web-server via at least one portable application. Communication can also be achieved by land line such as telephone, cable, DSL and optical fibre.

The step of scheduling a routine retesting of a patient's eyes for at least one patient file not having any retinal fundus image classified with the normal classification may further comprise scheduling a new retesting date between 6 to 12 months at a facility with a fundus camera.

The step of scheduling an appointment with an ophthalmologist for at least one patient file which has at least one retinal fundus image classified with the not-normal classification may further comprise the web-server interfacing with the appointment medical facility to schedule and confirmation an appointment date.

The step of training the AI Engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the not-normal classification. Retinal fundus images graded by the system as not-normal can be sent to an specialist for grading. Once graded, the specialist-graded retinal fundus image can be used to further train the AI Engine; (vi) each retinal fundus image may comprise at least 3000*2000 pixels, has a fundus field of at least 45 degrees and has a pixel resolution of at least 150 dpi; (vii) the retinal fundus images of at least one patient file may be taken with a portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via a wireless data transmitter connectable to the portable fundus camera; (viii) the retinal fundus images of at least one patient file may be taken with a portable fundus camera and the step of receiving from a web-server may include transmission of at least one patient file via the portable fundus camera, wherein the fundus camera may include a wireless data transmitter; (ix) the web-server may host at least one national portal and at least one worldwide portal; or (x) at least one patient file may be uploaded to the web-server via at least one portable application.

By connecting a wireless data transmitter, such as a cell-phone, connectable to the portable fundus camera, the retinal fundus images and patient data can be instantly delivered to data center or laboratory hosting the AI Engine 1-03 and model 1-04 and quickly differentiated between not-normal and normal classification. Subsequent treatment such as scheduling a routine retesting or an in-office ophthalmologist appointment can be recommended from the classification of a patient's retinal fundus images. In this way, rural or remote areas can be serviced with a portable fundus camera. The patient data can be entered on a portable application and then transmitted over the local cell phone data network. The portable fundus camera with its own wireless data transmitter and/or patient data could also be used for patient data entry and wireless data transmission. Through the portable application, the patient can make medical appointments, obtain referrals to public hospitals and access health information services, the content of which may be tailored to his medical history contained in his/her patient files.

The web-server 2-05 can host multiple portals for uploading of the patient files. The portals may be organized by nation, region, language or be worldwide. At least one or more portal may be accessible via the portable application.

In the foregoing detailed description, embodiments of the present disclosure are described with reference to the provided figures. The description of the various embodiments herein is not intended to call out or be limited only to specific or particular representations of the present disclosure, but merely to illustrate non-limiting examples of the present disclosure.

The present disclosure serves to address at least some of the mentioned problems and issues associated with the prior art. Although only some embodiments of the present disclosure are disclosed herein, it will be apparent to a person having ordinary skill in the art in view of the present disclosure that a variety of changes and/or modifications can be made to the disclosed embodiments without departing from the scope of the present disclosure. The scope of the present disclosure as well as the scope of the following claims is not limited to embodiments described herein.

CLAIMS

1. An eye screening method comprising the steps of:

(a) loading a plurality of specialist-graded retinal fundus images into a database;

(b) training an AI Engine to operate on the specialist-graded retinal fundus images, the AI Engine comprising at least one of a machine learning algorithm and a deep learning algorithm, wherein the AI Engine comprises at least one of a support vector machine (SVM), a gradient boosting machine (GBM), a Random Forest and a convolutional neural network (CNN);

(c) building a model from the specialist-graded retinal fundus images using the AI Engine to differentiate between only one of a normal classification and a not-normal classification;

(d) receiving from a web-server a plurality of patient files, wherein each patient file includes:

(i) a plurality of patient data;

(ii) a plurality of retinal fundus images that are un-graded;

(e) loading the patient files into the database;

(f) differentiating with use of the model the retinal fundus images of each patient file between only one of the normal classification and the not-normal classification; and

(g) updating each patient file to classify the retinal fundus images as only one of the normal classification and the not-normal classification.

2. The method of claim 1, wherein each of the specialist-graded retinal fundus images are an ophthalmologist-graded retinal fundus image.

3. The method of claim 1, further comprising the step of scheduling a routine retesting of a patient's eyes for at least one patient file not having any retinal fundus image classified with the not-normal classification.

4. The method of claim 1, further comprising the step of scheduling an appointment with an ophthalmologist for at least one patient file having at least one retinal fundus image classified with the not-normal classification.

5. The method of claim 1, further comprising the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the normal classification.

6. The method of claim 1, further comprising the step of training the AI engine based upon an ophthalmologist grading of the retinal fundus images of at least one patient file with the not-normal classification.

7. The method of claim 1, wherein each retinal fundus image comprises at least 3000*2000 pixels, has a fundus field of at least 45 degrees and has a pixel resolution of at least 150 dpi.

8. The method of claim 1, wherein the step of differentiating further comprises use of at least one of the following eye criteria:

(a) a plurality of retinal vessels in focus;

(b) a cup to disc ratio <0.3; and

(c) an absence of at least one of:

(i) a visible media opacity;

(ii) a diabetic retinopathy indicator including at least one of a blot haemorrhage, a micro-aneurysm and a hard exudate;

(iii) a diabetic maculopathy;

(iv) a macula oedema;

(v) an exudate near a macula;

(vi) an exudate on a macula;

(vii) a laser scar;

(viii) cataract;

(ix) glaucoma;

(x) diabetic retinopathy; and

(xi) an age related macular degeneration including at least one of a multiple large drusen, a geographic atrophy with distinct areas of hypopigmentation and a choroidal neovascular membrane, wherein the age related macular degeneration is indicative of at least one of an atrophic, a neovascular and an exudative;

wherein at least one eye criterion can be excluded.

9. The method of claim 1, wherein:

(a) the retinal fundus images of at least one patient file are taken with a portable fundus camera;

(b) the step of receiving from a web-server includes transmission of at least one patient file via a wireless data transmitter connectable to the portable fundus camera.

10. The method of claim 1, wherein:

(a) the retinal fundus images of at least one patient file are taken with a portable fundus camera;

(b) the step of receiving from a web-server includes transmission of at least one patient file via the portable fundus camera, wherein the fundus camera includes a wireless data transmitter.

11. The method of claim 1, wherein the web-server hosts at least one national portal and at least one worldwide portal.

12. The method of claim 1, wherein at least one patient file is uploaded to the web-server via at least one portable application.