Automatic grading of retinal blood vessel tortuosity for Detect diabetic retinopathy

Detect diabetic retinopathy to stop blindness before it's too late

Description:

Imagine having the ability to predict blindness in advance.

Diabetic retinopathy, the primary cause of blindness in working-age adults, affects millions of individuals. The Aravind Eye Hospital in India wants to identify and stop the spread of this illness among rural residents where medical screening is challenging to do. The hospital's capacity to find new patients will improve thanks to the winning entries in this competition.

Currently, Aravind technicians visit these remote places to take pictures before relying on highly skilled physicians to examine the pictures and offer a diagnosis. Their objective is to leverage

technology to scale their efforts, giving them the power to automatically detect disease in photos and offer details about the potential severity of the issue.

You'll create a machine learning model in this synchronous Kernels-only challenge to hasten illness diagnosis. To assist in automatically identifying diabetic retinopathy, you'll work with thousands of photos gathered in rural regions. If you are successful, you will not only aid in the fight against blindness for the rest of one's life, but these models might also be used to the detection of glaucoma and macular degeneration in the future.

Start right away!

Dataset Description:

You are given access to a sizable collection of retina photographs that were captured utilising fundus photography in a range of imaging scenarios.

On a scale from 0 to 4, a medical professional has given each image a severity rating for diabetic retinopathy:

0 - No DR

1 - Mild

2 - Moderate

3 - Severe

4 - Proliferative DR

Both the labels and the photos will include noise, much like any real-world data collection. Images might be out of focus, overexposed, underexposed, or contain artefacts. The photos were collected over a long period of time from many clinics using a variety of cameras, which will result in additional diversity.

EYE CARE:

The following goals were established when the Centre first opened:

1. To provide cutting-edge healthcare based on reliable scientific principles and modern technologies.

2. Ensure that the patient receives holistic treatment that isn't simply eye-catching but focuses on their whole health.

3. Deliver the aforementioned services at a reasonable price to all patients who want our care and assistance.

4. Increase awareness about eye conditions and spread it to others.

5. Be socially responsible for the treatment of people who are in need.

To provide patients with one-stop eye care, the centre also has optical services, a pharmacy, microbiological labs, and biochemistry facilities. For patients who are physically challenged, it has a lift and wheelchair access for easy access to the facilities. It is a building with NABH accreditation.

Meet Our Team:

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Services:

Why eye examination?

The eye examination helps us to detect the conditions like glaucoma, hidden hyperopic correction, intermittent squint, Colour deficiency, retinal weakness (degenerations), muscle weakness (accommodative eye muscle problems), which are rarely noticed by people on their own, apart from usual spectacle corrections and treatment for other diseases of the eye.

What does the optometrist do?

The optometrist does the following procedures before the doctors see you.

history- information about the problems of eyes , general health and the medications that are being used

to check the glass power is appropriate

to check for any eye muscle problems associated with focusing difficulty, head ache, eye strain, double vision, glare and distortions

to check eye pressure

These have been done as a routine and the eyes will be dilated with eye drops for the doctor to see.

What is an eye examination?

A complete eye exam starts with a detailed history of eye and general health problems, problems in other family members, and current medication history. The power of the spectacles being used is then checked and visual acuity is recorded with the correction being used – glasses or contact lenses. If the vision is found to be less than optimal refraction is performed and recorded to provide the optimal correction. The movements of the eye and the papillary reactions are then tested. A slit-lamp examination is performed to allow a study of the structures of the eye under adequate illumination and magnification, after which the intraocular pressure is measured. The pupils are then dilated to examine the retina and optic nerve in detail. All of these can be performed quickly and effectively by a well trained optometrist.

How long does an eye examination take?

This examination routine usually takes 10 to 15 minutes and dilatation of the pupils another 30 minutes. After dilatation, the ophthalmologist will complete the retinal evaluation and discuss the findings with you. The cause of problems if any and the requisite treatment measures are then discussed. The entire process should take an hour from start to finish.

When is an eye examination required?

Obviously, any change in vision or ocular comfort warrants an immediate eye exam, as does an injury to the eye. Other indications for an eye exam are abnormal head postures or squinting eyes in children, or a tendency to hold objects very close to the eyes. Even in asymptomatic children, a routine screening evaluation at the time of schooling can help detect conditions like a ‘lazy’ eye, small degrees of squint, color deficiency, and loss of 3-dimensional perception. In adults, a routine evaluation at the age of 40 years, allows the detection and correction of presbyopia, and monitors the intraocular pressure to ensure that glaucoma does not exist. Periodic eye exams after the age of 50 years at yearly intervals, or when systemic conditions like hypertension or diabetes are detected are necessary.

Are specialized tests done routinely during an eye exam?

Apart from the routine procedures described above, if problems are detected, then your ophthalmologist may decide to order special investigations and procedures, after discussing their need with you. These could include investigational procedures like visual field examination and photography of the optic nerve for glaucoma, corneal topography and pachymetry to determine your suitability for LASIK, ocular ultrasonography for evaluating the posterior segment of the eye, fundus fluorescein angiography for retinal disease, keratometry and eyeball length measurement for determining the power of the intraocular lens required during cataract surgery, or laser procedures using the Nd:YAG or Argon lasers for other eye problems.

Do these specialized tests and procedures require another visit or travel to another facility?

No. All of these can be performed during the primary visit, and can be done at Darshan Eye Care itself – as the center is fully equipped for total vision care.

Problems in the eye or brain can affect vision. It is accepted that all children should have a screening exam. Adults above 45 years must also have a yearly check. An eye exam is one of the best ways to protect your vision because it can detect eye problems at their earliest stage — when they're most treatable. Regular eye exams give your eye doctor at Darshan Eye Clinic a chance to help you correct or adapt to vision changes. Your eye care specialists can also give you expert tips on reducing eyestrain and caring for your eyes.

LOW VISION CLINIC

Definition: LOW VISION IS NOT NO VISION!" The definition of legal blindness is a visual acuity of 20/200 in the best eye with best correction or a visual field of 20 degrees or less.

What is Low Vision?

Low vision is a visual impairment severe enough to interfere with performance of daily activities, yet allowing some usable vision.

What Causes Low Vision?

There are many different conditions that can cause low vision, including:

- Macular Degeneration
- Diabetic Retinopathy
- Cataracts
- Glaucoma

People with low vision may have difficulty with daily living activities such as:

- Dressing
- Cooking
- Use of dials on the microwave, telephone
- Reading
- Writing

Therapy can help you regain and maintain independence in your life. What to Expect

To assess your visual impairments

Train you in the use of adaptive equipment

Educate you about techniques that compensate for low vision

Help you to return to functional and independent living

Orthoptics Clinic

Orthoptics, meaning “straight eyes,” is one of the medical sciences specializing in eye care. Orthoptics is the study of the development of vision, depth perception and the ability to use the eyes together, eye alignment, eye movements, and eye coordination. The orthoptist’s particular area of expertise is the evaluation and management of children and adults with “crossed” eyes, “lazy” eye, double vision, and other eye coordination problems.Orthoptic evaluation involves the measurement of the muscle action according to the age requirements, including any deviation of the eye

TERMS USED

Stereopsis The ability to perceive the depth perception

Accommodation The ability of the eye to focus for distance and near by stimulation and relaxation of the muscles.

Amplitude The reading materials kept at normal working conditions converted into power (Diopter)

Convergence The ability of the eye to work or focus by converging (moving the eye ball inwards)

Orthoptics involves the measurement of accommodation, amplitude and convergence.

Facilities at Darshan Eye Clinic for an Orthoptic Evaluation:

The optometrist at Darshan is equipped with all equipments needed for a complete orthoptic eye exam

TITMUS FLY CHART or measuring Stereopsis

ISHIHARA CHART for colour vision testing

Flippers for measuring accommodation and vergence functions

Maddox rod and Worth four dot for the measurement of double vision (diplopia)

Prism bar for measurement of squinting of the eye and convergence

Orthoptek for giving exercise to lazy eye.

Computer Vision Syndrome

Most people who work constantly with computers tend to have some or all of the following symptoms – eyestrain, eye fatigue, dry eyes, light sensitivity, blurred vision, loss of focus, double vision, headaches, and neck and shoulder pains. It is a combination of eye related symptoms like eye strain eye fatigue, dry eyes, light sensitivity, blurred vision, focusing difficulty, double vision, head aches, neck and shoulder pain .This symptom complex has been termed the computer vision syndrome (CVS).

Symptoms and Recommendations:

1. Blurred vision on seeing the computer – if there is any refractive correction please wear the glasses regularly

2. Eye strain at the end of the day – please give adequate breaks every 20 min and try to look at 20 feet for about 20 secs

3. Dry eyes – it may be due to inadequate blinking. Try to blink at least 15 times in a minute and apply artificial tears as per the doctor's instruction

4. Double vision – The problem may be due to the poor fusing mechanism or reduced focusing ability of the eye muscles. Please consult the doctor to see if the following exercises are required

a) Pencil push up

b) Accommodative rock

c) Cat card

d) Accommodative flippers

5. Postural pain – please follow the recommended ergonomics to avoid the problems

Ergonomics:

1. the monitor should be kept away from the eyes by at least one arm distance

2. viewing angle should be 10 to 15 degrees below the straight ahead eye position

3. the lighting should be adequate without producing reflections either on the screen or to the eyes

4. please keep the keyboard tabs flat, rising the tab can make wrist angle while typing which can produce wrist pain

5. keep the shoulders relaxed and not raised to avoid shoulder pain.

6. keep the neck and head straight and make the eye angle down to see the monitor. The table height or the computer height can be adjusted.

7. the legs should make an obtuse angle or atleast an right angle to the floor to avoid thigh and joint pain

8. the sitting chair can be made with aback support; if not a small pillow can be used to support the spinal cord.

9. try to sit erect and avoid any forward bend of the back bone which makes the vertebral column relaxed.

10. letters to be typed can be placed in the letter holder to avoid any down, up head movements.

11. maintain proper font size, contrast, font. Black and white contrast is better and safe.

What causes glaucoma and how can it be treated?

Facilities at Darshan Eye Clinic for Glaucoma

Applanation tonometry

Gonioscopy

Corneal Pachymetry

Anterior segment OCT for angle measurement

Disc photography

Automated Visual Field Analyzer

Optic Nerve Head Imaging

RNFL layer analysis

Ganglion cell analysis

YAG Laser

What are the symptoms of retinal disease?

Facilities at Darshan Eye Clinic for Retinal and Vitreous Diseases

Indirect ophthalmoscopy

B-Scan Ultrasonography

Special lenses for retina and vitreous evaluation

Optical coherence tomography

Digital Fundus photography and Angiography

Green Laser Treatment

Laser Indirect Ophthalmoscope

Cryotherapy

Glaucoma Clinic

Glaucoma (high eye pressure) is a leading cause of blindness in the elderly, by damaging the optic nerve. When damage to the optic nerve occurs, blind areas develop in the field of vision, and usually go undetected until the optic nerve is significantly damaged. The most common form has no symptoms in its early stages. Glaucoma has therefore been nicknamed “the silent sight thief”. Worldwide, it is the second leading cause of blindness. Glaucoma affects one in two hundred people aged fifty and younger and one in ten over the age of eighty. Early detection is the key to preventing this damage. A regular eye pressure check is the best way to detect glaucoma.

Patient Information:

What is glaucoma?

Glaucoma is a leading cause of blindness especially for older people. It is a disease of the optic nerve. When damage to the optic nerve occurs, Blind spots in the field of vision develop, and usually go undetected until the optic nerve is significantly damaged. Early detection and treatment are the keys to preventing optic nerve damage.

What causes glaucoma?

Clear liquid called aqueous humor circulates inside the front portion of the eye and flows out through a drainage system (located in the angle of the anterior chamber). If the drainage angle is blocked or inefficient, the aqueous humor cannot flow out of the eye. Fluid pressure within the eye increases, pushing against the optic nerve and causing damage.

What are the different types of glaucoma?

Chronic open-angle glaucoma: This is the most common form of glaucoma. The drainage angle becomes less efficient over time, and pressure within the eye gradually increases, which can damage the optic nerve. Typically, open-angle glaucoma has no symptoms in its early stages, and vision remains normal. As the optic nerve becomes more damaged, blank spots begin to appear in your field of vision.

Glaucoma

Closed-angle glaucoma: Some eyes are formed with the iris (the colored part of the eye) too close to the drainage angle. In these eyes, which are often small and farsighted, the iris can block the drainage angle completely. The pressure inside the eye builds rapidly and causes an acute closed-angle attack. Symptoms may include: blurred vision, severe eye pain, headache, rainbow-colored halos around lights, and nausea and vomiting. This is a true eye emergency – call your eye doctor immediately. Unless this type of glaucoma is treated quickly, blindness can result.

Who is at risk for glaucoma?

The most important risk factors include age, elevated eye pressure, family history of glaucoma, farsightedness or nearsightedness, past eye injuries, thinner central corneal thickness, systemic health problems, including diabetes, migraine headaches, and poor circulation.

Your ophthalmologist will weigh all of these factors before deciding whether you need treatment for glaucoma, or whether you should be monitored closely as a glaucoma suspect.

How is glaucoma detected?

Regular eye examinations by your ophthalmologist are the best way to detect glaucoma. The only sure way to detect glaucoma is to have a complete eye examination.

During your glaucoma evaluation, your ophthalmologist will: measure your intraocular pressure (tonometry); inspect the drainage angle of your eye (gonioscopy); evaluate whether or not there is any optic nerve damage (ophthalmoscopy); and test the peripheral vision of each eye (visual field testing, or perimetry).

How is glaucoma treated?

As a rule, damage caused by glaucoma cannot be reversed. Eye drops, laser surgery, and surgery in the operating room are used to help prevent further damage. In some cases, oral medications may also be prescribed. Periodic examinations are very important to prevent vision loss. Because glaucoma can progress without your knowledge, adjustments to your treatment may be necessary from time to time.

General information:

Regular medical eye exams help prevent unnecessary vision loss. Recommended intervals for eye exams are:

Ages 20 to 29: Individuals with a family history of glaucoma should have an eye examination every 3 to 5 years. Others should have an eye exam at least once during this period.

Ages 30 to 39: Individuals with a family history of glaucoma should have an eye examination every 2 to 4 years. Others should have an eye exam at least twice during this period.

Ages 40 and older: Every year.