

# An Elaborate Survey on Identification of Wilson Disease Using Kayser Fleischer Ring

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**Abstract-**Wilson disease is a rare pathology and genetic disorder due to malfunction in copper excretion from human body. Individuals with neurological disorder shows a visible symptom in the cornea of eye due to excess copper accumulation is known as Kayser- Fleischer ring, it is golden brown or greyish in color. Medical screening is considered as a diagnostic sign of Wilson disease but sometimes error may occur due to wrong interpretation. The aim to provide an innovative non-invasive technique based on ocular biometric measurements to reduce possible human interpretation error. Image processing algorithms are used detect kayser Fleischer ring such as JSEG segmentation.

**Index Terms:** Neurological disorder, Kayser-Fleischer ring, biometric measurements, JSEG segmentation.

## 1. INTRODUCTON:

In neurophysiology pathogenesis of neurological disorder is a complex issue. The cause of such pathogenesis is unknown. Normally, proper intake of copper is essential for regular growth of human body i.e. appropriate dose is essential. Excess amount of copper in brain leads to neurological problems. Transporter protein is one kind of protein it has the responsibility to carry the copper inside the cells. It is taken by food in healthy individuals, the balances the copper inside amount by excretion [1], [2]. Patients with Wilson's disease can present with chronic liver disease, hepatic failure, acute renal failure, neuropsychiatric disease such as disorder of movement, tremors, in coordination, and behavioral changes. The origin of pathology is due to gene mutation. Wilson disease is a rare disease, it can be inherited from both carrying parents the defected gene without showing any symptoms. Child inherits the defected gene from both carrying parents, the child may be affected from Wilson disease. There is a case for every 40000 births. The first clear sign of Wilson disease usually appears between the ages of 5 to 20 years. Wilson disease shows severe symptoms in the human brain. [14], [16].

Kayser Fleischer ring is the hallmark of Wilson disease, it is a golden brown and some occasion it may be orange or greyish ring. Without proper

treatments, symptoms tend to become progressively more and more acute and chronic, the disease may be fatal. [6],[7].Medical screening shows that individuals with neurological disorders develop a golden brown ring around their cornea in the effect of copper deposit. Kayser Fleischer ring is the characteristic sign of golden brown ring. To diagnose Wilson disease many medical screening tools available. Some of available techniques to detect Wilson disease are magnetic resonance imaging of brain, urine or blood test, genetic test. Presence of kayser Fleischer is considered as critical for diagnosing the Wilson disease in medical trails. The thickness or density of the ring depends on the severity of the disease, thickness of the ring increases means it can be observed using naked eye. It is an asymptotic and it can be recognized by normal eye. Normally kayser Fleischer ring is found in 95% of individuals. So detection of kayser Fleischer ring is must in early stages, it can be used for diagnosis.

Ophthalmology studies shows that patient with neurological disorders have kayser Fleischer ring. Ophthalmologist are experienced in identifying kayser Fleischer, sometimes false negative diagnosis are possible. Automated detection technique is developed to diagnose Wilson disease using image processing algorithm. To measure the severity level of the disease biometric measurements is used. The aim is to reduce the possible human interpretation

error. In section II going to discussed about approaches to detect Wilson disease. In section III literature survey of algorithms used to detect.

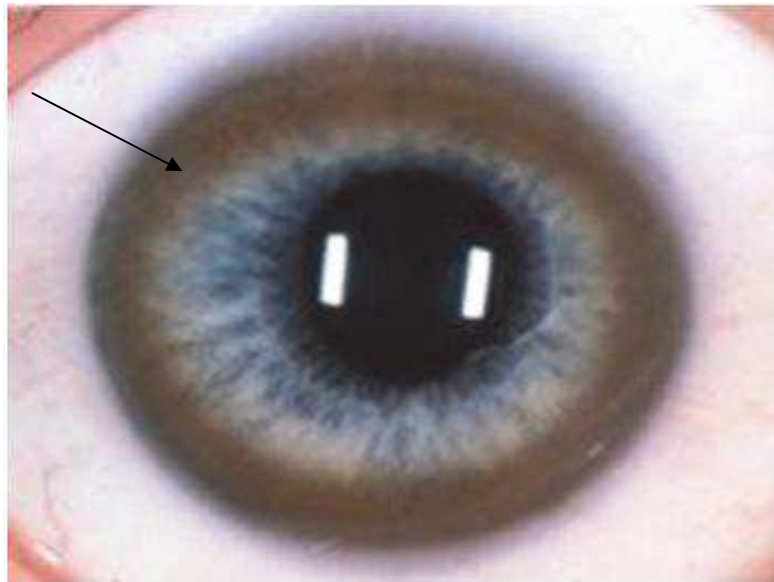
## **2. SECTION II**

### **2.1. APPROACHES AND METHODS TO DETECT NEUROLOGICAL DISORDER**

Image processing plays an important role in the field of medical to detect specific structures. Image processing is the basic for automated detection algorithm. To diagnose patients with Wilson disease, an image processing algorithm is used. Segmentation plays an important role in detection algorithm. To detect kayser Fleischer ring JSEG (j value based segmentation) segmentation algorithm is used. JSEG segmentation is one type of hybrid segmentation algorithm. The automated detection algorithm to detect kayser Fleischer ring several steps. The steps to detect kayser Fleischer ring are explained below.

#### **2.1.1.STEPS TO DETECT KAYSER FLEISCHER RING**

- 1) First step is the primary process, consists to get an eye image from the patients suffering from Wilson disease.
- 2) Second step is to detect the kayser Fleischer ring, an automated segmentation algorithm is used. JSEG segmentation algorithm is used as a detection algorithm, normally JSEG segmentation is done in two phases, the first phase is color quantization then the second phase is spatial segmentation. First perform color quantization, at the end of this process get a color class image, and then spatial segmentation is performed.
- 3) After get color class image spatial segmentation is performed, which is the second step of the detection algorithm.
- 4) At end of the spatial segmentation algorithm get a J-image, once J-image is obtained region growing method is performed to complete the segmentation process.
- 5) Final segmentation is achieved by region merging algorithm.
- 6) After completing JSEG segmentation need to define a set of values, to find the severity level of the disease.



Fig(1) sample image of eye with kayser Fleischer ring [5]

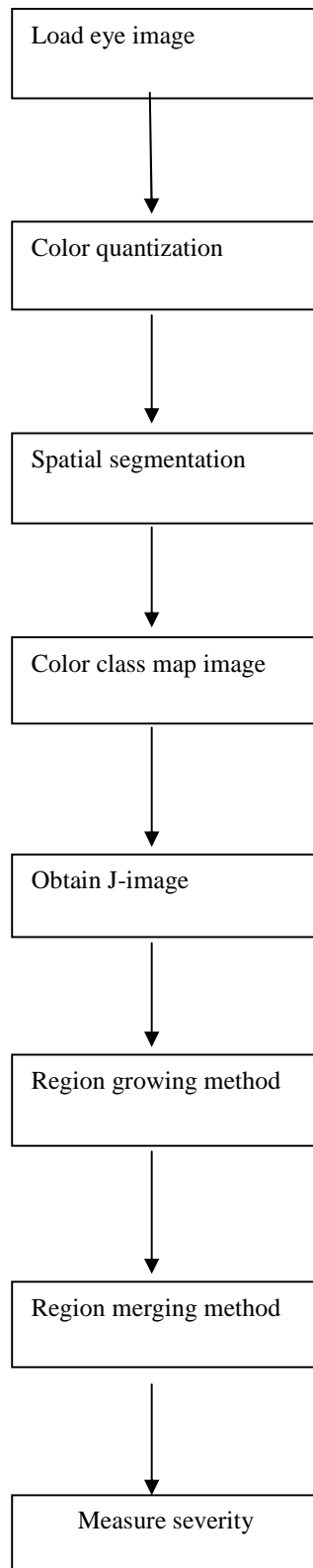


Fig 2. Flow chart of JSEG segmentation algorithm [5]

**3. SECTION III**

Table 1. Literature survey

<b>Sr.No</b>	<b>Paper title</b>	<b>Description</b>	<b>Algorithm used</b>	<b>Advantage</b>	<b>citation</b>
1	Unsupervised segmentation of color texture regions in images and video	For color texture region in image and video unsupervised segmentation is used.	JSEG segmentation algorithm is used.	Robustness of the JSEG algorithm on real images and video.	[6]
2	2-D wavelet segmentation in 3-D T-ray tomography	To achieve material discrimination within a 3-D object wavelet segmentation is used.	Linear image fusion and wavelet scale correlation segmentation algorithms were used.	Algorithm successfully segmented different target regions and able to locate the regions to within few pixel.	[7]
3	Pigment melanin: pattern for iris recognition	To recognize pattern of iris proposes a fusion of features extracted from NIR (near infrared) VL.	Shape analysis method is used.	Proposed method is highly resistant to noise in VL(visible light).	[8]
4	Fully automatic segmentation of liver and hepatic tumors from 3-D computed tomography abdominal images: comparative evaluation of two automatic methods	An adaptive initialization method was proposed to produce fully automated framework.	Graph cut and gradient flow active contour method were used.	Proposed method enables non invasive technique for hepatic tumor.	[9]
5	Automated data fusion and visualization for impact-echo testing of concrete structures	Proposed a automated data fusion and direct visualization of internal defects of concrete structures based on impact echo testing.	Threshold and region growing methods are used to detect defect region.	Noises are fully removed using proposed approach.	[10]
6	Noise measurement for raw-data of digital imaging sensors by automatic segmentation of non uniform targets.	Proposed a new method for measuring the temporal noise in the raw data of digital imaging sensor.eg. CMOS	Automated segmentation algorithm is used.	This method allows non-uniform targets.	[11]
7	Unified framework for automated iris segmentation using distantly acquired face images	Proposed a new iris segmentation framework which can robustly segment the iris images using infra red or visible illumination.	Robust segmentation algorithm is used.	This method shows high potential for surveillance and application used in forsenic.	[12]

8	Application of radial ray based segmentation to cervical lymph nodes in CT images	3-D segmentation of lymph nodes in CT images is required for staging and disease progression monitoring.	Radial ray based segmentation algorithm is used.	Compared to manual segmentation proposed segmentation has many efficiency.	[13]
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#### 4. CONCLUSION

In this paper discussed about detailed literature survey of algorithm to detect patients affected with Wilson disease. Wilson disease is a rare disease occurs due to excessive copper accumulation in the body. Kayser Fleischer ring in the cornea of eye is symptom. So detection of Kayser Fleischer ring is important, existing technique to detect Wilson disease was medical screening. In medical screening sometimes human interpretation error may be possible. Automated detection algorithm was proposed using image processing algorithm, JSEG segmentation algorithm is used. Future work was focused on various images processing algorithm like K-means clustering algorithm, and then compare performance analysis of two algorithms.

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