

# Developing an Expert System for Uveitis Disease Diagnosis

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**Abstract:** Our eyesight is one of your most important senses: 80% of what we perceive comes through our sense of sight. By protecting your eyes, you will reduce the odds of blindness and vision loss, one of things that may cause vision loss is Uveitis. Uveitis is a form of eye inflammation. It affects the middle layer of tissue in the eye wall (uvea). Uveitis (u-vee-I-tis) warning signs often come on suddenly and get worse quickly. They include eye redness, pain and blurred vision. The condition can affect one or both eyes. It primarily affects people ages 20 to 50, but it may also affect children. Possible causes of uveitis are infection, injury, or an autoimmune or inflammatory disease. Many times a cause can't be identified. Uveitis can be serious, leading to permanent vision loss. Early diagnosis and treatment are important to prevent the complications of uveitis. Because of that we designed an expert system to help people to know if they got Uveitis early after that they can get treatment and they will save their eyes.

**Keywords:** Expert System, Papaya Plant Disease, Diagnosis

## 1. INTRODUCTION

Uveitis is inflammation of the uvea — the middle layer of the eye.

Uveitis can have many causes, including eye injury and inflammatory diseases. Exposure to toxic chemicals such as pesticides and acids used in manufacturing processes also can cause uveitis.

Many cases of uveitis are chronic, and they can produce numerous possible complications, including clouding of the cornea, cataracts, elevated eye pressure (IOP), glaucoma, swelling of the retina or retinal detachment. These complications can result in permanent vision loss[1].



Figure 1: The figure shows Uveitis.

Artificial intelligence (AI) is a science and technology based on disciplines such as computer science, biology, psychology, linguistics, mathematics, and engineering. The goal of AI is to develop computers that can think, see, hear, walk, talk and feel. A major thrust of AI is the development of computer functions normally associated with human intelligence, such as reasoning, learning, and problem solving.

The most important applied area of AI is the field of expert systems. An Expert System (ES) is a knowledge-based system that employs knowledge about its application domain and uses an inferencing (reason) procedure to solve problems that would otherwise require human competence or expertise. The power of expert systems stems primarily from the specific knowledge about a narrow domain stored in the expert system's knowledge base.

It is important to stress to people that expert systems are assistants to decision makers and not substitutes for them. Expert systems do not have human capabilities. They use a knowledge base of a particular domain and bring that knowledge to bear on the facts of the particular situation at hand [2].

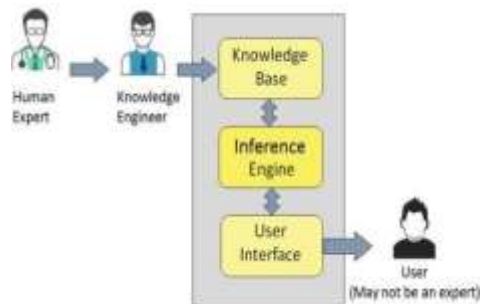


Figure 2: The figure shows Expert System component [3]

## 2. MATERIALS AND METHODS

The proposed Expert System for Uveitis Diagnosis was implemented using, SL5 Object language. which stands for Simpler Level 5 Object. It is a forward chinning reasoning expert system that can make inferences about facts of the world using rules [4].with using SL5 its became easy of us to create an expert system with a good interface where the end users will not face any difficulty when they using our expert system.

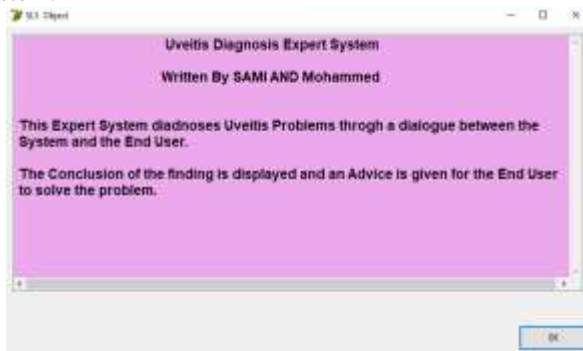


Figure 3: The figure shows Uveitis expert system

The expert system will show some questions to user and the user should answer them all to know if he or she got Uveitis or not.

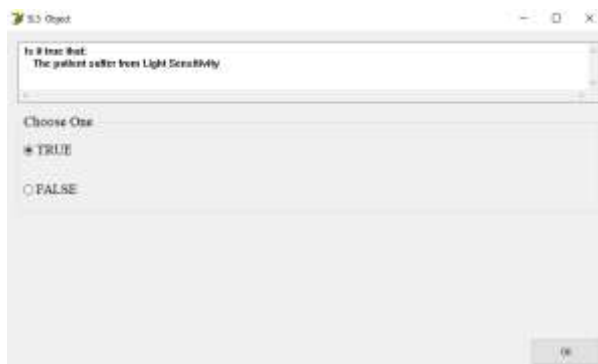


Figure 4: The figure show question with tow answer yes or no.

After analyzing the answers by the expert system, the system shows if user got the Uveitis or not .



Figure 5: The figure shows how the users get the result and recommendation

## 3. LITERATURE REVIEW

There are many expert systems that are developed for diagnosing human medical problems like:

- An Expert System for Mouth Problems in Infants and Children [61] ask the user to answer the questions about the symptoms of the patient and end up with some information about the disease and some advices telling the user how to deal with the baby.
- Knowledge Management in ESMDA: Expert System for Medical Diagnostic Assistance [11] deals with the design of a prototype expert system that assists patients to diagnose their diseases and offer them the suitable advice.
- Expert System for the Diagnosis of Seventh Nerve Inflammation (Bell’s palsy) Disease [12] diagnosis the seven nerve inflammation which will help doctors to explore everything related to the problems of seventh nerve inflammation. We look forward to providing simplified answers to seven nerve inflammation.
- Knowledge Based System for the Diagnosis of Dengue Disease [10] to help doctors and patients in diagnosing Dengue Disease and give them the information of how to prevent Dengue Disease and to be able to understand the signs and symptoms of Dengue Disease.
- An Expert System for Arthritis Diseases Diagnosis Using SL5 Object[8] to help Orthopedist in diagnosing Arthritis disease through its symptoms such as: pain on pressure in a joint, Inflammation indicated by joint swelling, Stiffness.
- A Proposed Expert System for Diagnosing Skin Cancer Using SL5 Object [66] quickly diagnose patient’s condition and propose a suitable solution for the problem.

- An Expert System for Depression Diagnosis [13] to get the appropriate diagnosis of disease and the correct treatment and give the appropriate method of treatment through several tips that concern the disease and how to treat it.
- Knowledge Based System for Diabetes Diagnosis Using SL5 Object [51] to get the appropriate diagnosis of the illness, dealing with it quickly, and tips for permanent treatment whenever possible is given out.
- Hepatitis Expert System Diagnosis Using S15 Object [36] diagnoses the patient's condition and provides the appropriate solution.
- Knowledge Based System for Long-term Abdominal Pain (Stomach Pain) Diagnosis and Treatment [62] was made to aid internist physicians in diagnosing numerous of the abdomen diseases for example: gastritis, hiatal hernia, ulcer or heartburn; the proposed expert system offers a summary about abdomen diseases are given, the cause of diseases are drew and the cure of disease when possible is shown up.
- Knowledge Based System for Ankle Diseases Diagnosis [49] recognized seven ankle diseases: Ankle Sprain, Fracture (of Fibula), Rheumatoid Arthritis, Rheumatoid Fever, Gout, and Osteoarthritis (Degenerative Joint) and they developed the expert system for those ankle diseases using SL5 Object Expert System Language.
- An Expert System for Diagnosing Shortness of Breath in Infants and Children [40] for diagnosing infants and children patients with twelve various shortness of breath in infants and children diseases.
- Polymyalgia Rheumatic Expert System [7] outlined an expert system for classification criteria for PMR, recent advances of diagnostic and therapeutic procedures.
- Expert System for Chest Pain in Infants and Children [56] to assist doctors, parents, and care giver in diagnosing chest pain in infants and children.
- Rickets Expert System Diagnoses and Treatment [45] assist doctors to discover everything connected to the problems of rickets.
- Expert System for Hair Loss Diagnosis and Treatment [68] for diagnosing eleven diverse hair loss diseases of the human stages from childhood to adults by asking questions with a Yes or No answer.
- Expert System for Problems of Teeth and Gums [42] assist people with teeth and gums problems to diagnose their problems and receive a recommendation for the treatment. This knowledge based system was developed using SL5 Object language.
- Ear Diseases Diagnosis Expert System Using SL5 Object [38] swiftly diagnoses patient's condition and proposes a appropriate answer for the problem.
- An expert system for feeding problems in infants and children [41] to diagnose feeding problems in infants and children.
- Detecting Health Problems Related to Addiction of Video Game Playing Using an Expert System [44] to assist users in getting the correct diagnosis of the health problem of video game addictions that range from (Musculoskeletal issues, Vision problems and Obesity). Furthermore, this expert system delivers information about the problem and tells us how we can solve it.
- An expert system for men genital problems diagnosis and treatment [50] to assist men diagnose their genital problems and give them the suitable treatment. Genital problems and injuries usually occur through: recreational activities (such as: Basketball, Football, Hooky, Biking), work-related tasks (such as: contact to irritating chemicals), downhill drop, and sexual activities. SL5 Object expert system language was used to develop this expert system.
- An Expert System for Genital Problems in Infants [57] diagnoses genital problems in infants which is one of the most common problems that need quick intervention in the newly born stage.
- An expert system for nausea and vomiting problems in infants and children[60] to aid users in getting the right diagnosis of problems of nausea and vomiting in infants and children (Gastro-esophageal reflux, Gastroenteritis, Systemic Infection, Bowel obstruction, Tumors, A bleeding disease, tonsillitis, and Hepatitis pharynx). Additionally, this expert system offers information about the disease and how to deal with it.
- A Ruled Based System for Ear Problem Diagnosis and Treatment [53] was used to classify ear problems into three main sets: a- Inflammation of the inner ear b- Middle ear problems c- External ear problems.
- Lower Back Pain Expert System Diagnosis and Treatment [46] can be used to positively diagnose low back pain concentration.
- A Proposed Expert System for Foot Diseases Diagnosis [56] diagnoses eighteen foot problems of all phases of the human life beginning with baby to the grownup by examining with yes/no questions.
- A Knowledge Based System for Neck Pain Diagnosis [52] can diagnose seven neck diseases of different phases of the human life beginning by asking the user many questions according to their pain symptoms.
- An expert system for shoulder problems using CLIPS [63] can help in diagnosing shoulder problems.
- Expert system urination problems diagnosis [67] can diagnose some of the Urination diseases

(Pyelonephritis, Kidney Stone, Bladder infection, Prostatitis, Urethritis, Gonorrhoea, Interstitial cystitis, Stress incontinence, Trauma in kidney or bladder).

- A Proposed Rule Based System for Breasts Cancer Diagnosis [55] was developed to help people in preventing and early detecting breast cancer; since it is known that this disease does not have medication or cure yet.
- A Proposed Expert System for Skin Diseases Diagnosis [69] was developed using CLIPS(C Language Integrated Production System) to help user diagnose the following skin diseases (Psoriasis, Eczema, Ichthyosis, Acne, Meningitis, Measles, Scarlet Fever, Warts, Insect Bites and Stings).
- Male Infertility Expert System Diagnoses and Treatment [48] for male infertility diagnosis which helps men to explore everything related to the problems of infertility and infertility diseases such as: Azoospermia, O.T.A syndrome which mean oligo-terato-astheno spermia, Aspermia and Sexual transmitted disease.

But there is no specialized expert system for the diagnosis of Uveitis disease available free and use SL5 Object language. This expert system is easy to use by doctors and patients. This is due to the user friendly interface.

**4. KNOWLEDGE REPRESENTATION**

The main sources of the knowledge for this expert system is a Specialized websites for Uveitis disease. This knowledge has been converted into SL5 Knowledge base syntax [5]

4.1 Uveitis Symptoms :

- Light Sensitivity.
- Blurring of Vision.
- Pain.
- Floaters.
- Redness.

**5. LIMITATION**

The current expert system is specialized only in the Uveitis disease.

**6. SYSTEM EVALUATION**

This expert system offers a user interface that makes it easy for users to know if he got Uveitis or not .

After experiment the system by expert people and a group of patients, the system gave them a satisfy results and

they don't find any difficulty while using the system .

**7. CONCLUSION**

In this paper we introduced an expert system that helps people to detect if they got Uveitis or not by asking them some questions about disease symptoms then system analyzing user answers and display result which is show is user got Uveitis or not based on the rules that was written with SL5 Object language.

**8. FUTURE WORKS**

We seek to develop this work by creating an expert system that can identify more than human diseases and more symptoms for each disease.

**9. SOURCE CODE**

! Written By Mohammed

!

ATTRIBUTE start SIMPLE

ATTRIBUTE The patient suffer from Light Sensitivity SIMPLE

ATTRIBUTE The patient suffer from Blurring of Vision SIMPLE

ATTRIBUTE The patient suffer from Pain SIMPLE

ATTRIBUTE The patient suffer from Floaters SIMPLE

ATTRIBUTE The patient suffer from Redness SIMPLE

INSTANCE the domain ISA domain WITH start := TRUE

INSTANCE the application ISA application WITH title display := introduction WITH conclusion display := Conc

INSTANCE introduction ISA display WITH wait := TRUE WITH delay changes := FALSE WITH items [1 ] := textbox 1

INSTANCE textbox 1 ISA textbox WITH location := 10,10,800,350

WITH pen color := 0,0,0 WITH fill color := 236,170,236 WITH justify IS left

WITH font := "Cairo"  
WITH font style IS bold  
WITH font size := 14  
WITH text :=  
Uveitis Diagnosis Expert System

Written By SAMI AND Mohammed

This Expert System diagnoses Uveitis Problems through a dialogue between the System and the End User.

The Conclusion of the finding is displayed and an Advice is given for the End User to solve the problem."

INSTANCE Conc ISA display  
WITH wait := TRUE  
WITH delay changes := FALSE  
WITH items [1] := title textbox  
WITH items [2] := problem textbox  
WITH items [3] := advise textbox

INSTANCE title textbox ISA textbox  
WITH location := 20,10,800,70  
WITH pen color := 0,0,0  
WITH fill color := 255,0,0  
WITH justify IS center  
WITH font := "Arial"  
WITH font style IS bold  
WITH font size := 14  
WITH text := " The Conclusion of the Uveitis Diagnosis Expert System"

INSTANCE problem textbox ISA textbox  
WITH location := 20,110,800,130  
WITH pen color := 0,0,0  
WITH fill color := 255,255,209  
WITH justify IS left  
WITH font := "Cairo"  
WITH font size := 14  
WITH text := " --====--"

INSTANCE advise textbox ISA textbox  
WITH location := 20,280,800,130  
WITH pen color := 0,0,0  
WITH fill color := 228,249,255  
WITH justify IS left  
WITH font := "Cairo"  
WITH font size := 14  
WITH text := " --====--"

RULE R0  
IF start  
THEN ASK The patient suffer from Light Sensitivity

RULE R1  
IF The patient suffer from Light Sensitivity  
THEN ASK The patient suffer from Blurring of Vision

RULE R2  
IF The patient suffer from Light Sensitivity  
AND The patient suffer from Blurring of Vision  
THEN ASK The patient suffer from Pain

RULE R3  
IF The patient suffer from Light Sensitivity  
AND The patient suffer from Blurring of Vision  
AND The patient suffer from Pain  
THEN ASK The patient suffer from Floaters

RULE R4  
IF The patient suffer from Light Sensitivity  
AND The patient suffer from Blurring of Vision  
AND The patient suffer from Pain  
AND The patient suffer from Floaters  
THEN ASK The patient suffer from Redness

RULE R5  
IF The patient suffer from Light Sensitivity  
AND The patient suffer from Blurring of Vision  
AND The patient suffer from Pain  
AND The patient suffer from Floaters  
AND The patient suffer from Redness  
THEN text OF problem textbox := "The patient suffer form Uveitis ."  
AND text OF advise textbox := "The Advice: You must refer to ophthalmologist for treating and screening as well which is equally important. "  
ELSE text OF problem textbox := "The patient does not suffer form Uveitis ."  
AND text OF advise textbox := "The Advice: Protect Your Eyes "  
END

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