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Expert system urination problems diagnosis

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Abstract
The urinary system is the organ system responsible for the production, storage and elimination of urine. This system comprises urethra, bladder, ureters and kidneys. It correspond to the major system which filters the blood and any imbalance of this organ can increases the rate of being infected with diseases. There are various Urinary System diseases having related symptoms, therefore, the main important objective -in order to prescribe the appropriate treatment - is the right diagnosis of the disease. In this paper the design of the proposed Expert System which was created to help Urination Problems in diagnosing some of the Urination diseases (Pyelonephritis, Kidney Stone, Bladder infection, Prostatitis, Urethritis, Gonorrhea, Interstitial cystitis, Stress incontinence, Trauma in kidney or bladder) are presented, an overview about the Urination diseases are displayed, the cause of diseases are outlined and the treatment of disease whenever is possible is given. SL5 Object language was used for designing the proposed expert system.

Keywords: Artificial Intelligence, Expert Systems, SL5 Object language, Urination diseases

Introduction
The urinary tract is the body's drainage system for getting rid of wastes and additional water. The urinary tract comprises a bladder, two kidneys, two ureters, and a urethra. The kidneys are two bean-shaped organs, each approximately the size of a fist. They are situated close to the middle of the back, just under the rib cage, one on every side of the spine. Daily, the two kidneys process around 200 quarts(a unit of liquid capacity equal to a quarter of a gallon or two pints, equivalent in Britain to approximately 1.13 liters and in the US to approximately 0.94 liter.) of blood to produce about 1 to 2 quarts of urine, composed of wastes and additional water. Children generate a lesser amount of urine than adults. The amount generated depends on their age. The urine runs from the kidneys to the bladder all the way through tubes identified as the ureters. The bladder retain urine until discharging it through urination. When the bladder is drained, urine flows out of the body through a tube identified as the urethra at the underneath of the bladder[3,4].

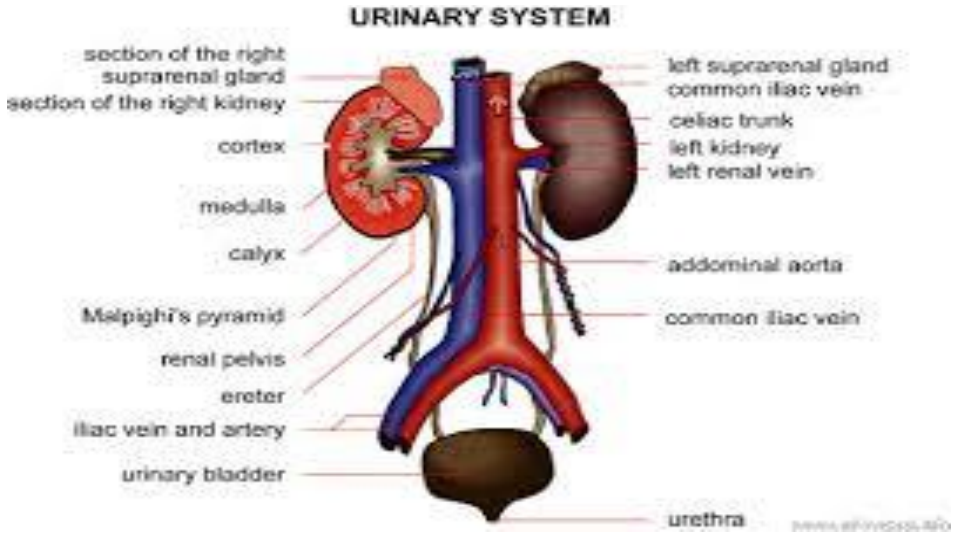

Fig 1: Urination System

Urinary System parts and their functions

The urinary System consists of the following parts[3,4]:

1. **Two kidneys.** This pair of purplish-brown organs is situated underneath the ribs toward the center of the back. Their function is to take away liquid waste from the blood in the form of urine; maintain a steady balance of salts and other substances in the blood; and construct erythropoietin, a hormone that assists the configuration of red blood cells. The kidneys take away urea from the blood throughout tiny filtering units identified as nephrons. Each nephron consists of a ball formed of small blood capillaries, called a glomerulus, and a small tube named a renal tubule. Urea, together with water and other waste substances, forms the urine as it passes through the nephrons and down the renal tubules of the kidney.

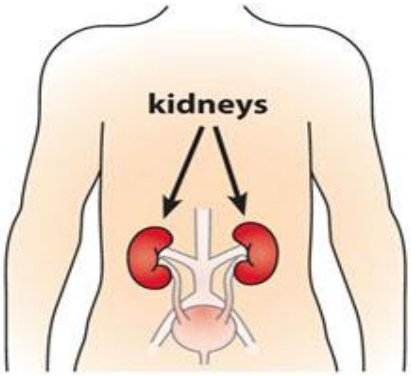

Fig 2: Shows the two Kidneys

2. **Two ureters.** These thin tubes bring urine from the kidneys to the bladder. Muscles in the ureter walls constantly tauten and rest making urine downward, outside the kidneys. If urine backs up, or is permitted to stay, a kidney infection may occur. About each 10 to 15 seconds, little amounts of urine are taken out into the bladder from the ureters.

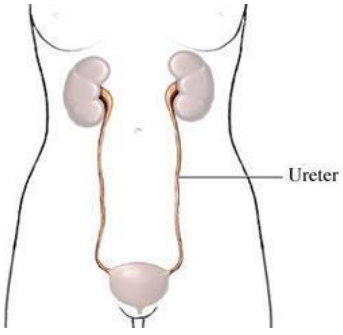

Fig 3: show the t**wo ureters**

3. **Bladder**. This triangle-shaped, vacant organ is situated in the lower abdomen. It is detained in position by ligaments that are affixed to other organs and the pelvic bones. The bladder's walls rest and enlarge to accumulate urine, and contract and squash to drain urine all the way through the urethra. The usual healthy adult bladder is able to store up to two cups of urine for approximately 2 to 5 hours.

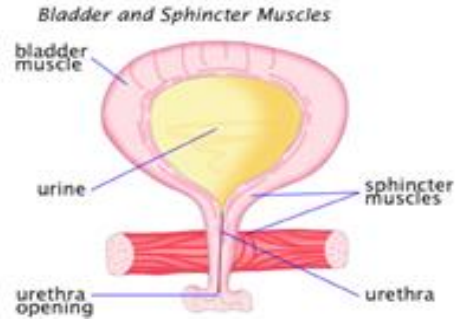

Fig 4: show the **bladder**

4. **Two sphincter muscles.** These circular muscles help maintain urine from seeping out by closing firmly similar to a rubber band surround the hole of the bladder.

Fig 5: show the two sphincter muscles

5. **Urethra**. This pipe permits urine to go by outer the body. The brain send a signals to the bladder muscles to tauten, which press urine away of the bladder. Simultaneously, the brain signals the sphincter muscles to lighten up to permit urine go out the bladder through the urethra. When all the signals happen in the right order, ordinary urination happens.

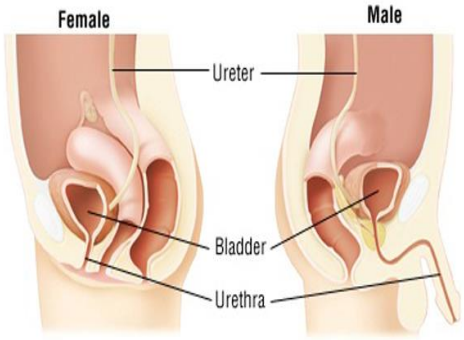

Fig 6: show the Urethra

Urination diseases are very general recently, a number of them are straightforward and simple to get better from, others are very dangerous and may have be no treatment for them; so we have to be careful of this significant organ in our body. Diagnosis of Urination diseases is a extremely complex particularly when more than single disease has with reference to similar symptoms; so they need dermatologists with extensive experience of Urination diseases. For all the reasons above, we have developed this expert system to help Urology in diagnosing some of the Urination diseases, in order to prescribe the appropriate treatment[3].

Expert System Definition

A computer application that performs a task that would

otherwise be performed by a human expert[1-2,6-8,10,15-23,31-33]. For example, there are experts systems that can diagnose human illnesses, diagnoses cars problems, make financial forecasts, and schedule routes for delivery vehicles. Some expert systems are designed to take the place of human experts, while others are designed to help them . Expert systems are part of a general category of computer Science known as artificial intelligence. To design an expert system, one needs a knowledge engineer, an individual who studies how human experts make decisions and translates the rules into terms that a computer can understand.

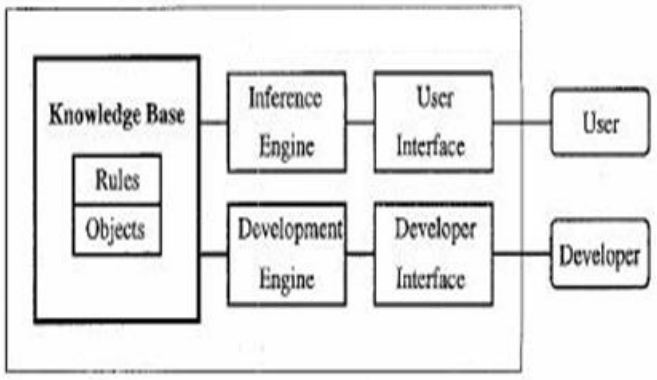

Fig 7: show the architecture of Expert Systems

The propped Expert System for Urination diseases diagnosis was implemented using, SL5 Object, the Simpler Level 5 Object Expert System Language, a rule-based language for specifying expert systems. Architecturally, SL5 Object is a production system executing a rule based program; thus, the SL5 Object language is a declarative (rather than imperative) language. The SL5 Object engine is implemented in Delphi Embarcadero RAD Studio XE6[10].

Background/ Literature Review

There are many expert Systems that were designed to diagnose diseases in general[1-2,6-8,10,15-23]; but a few for Urination diseases diagnosis; MYCIN is a well known expert system for diagnosing bacterial infections[25]. Wollina and Yoon developed expert systems in the domain of dermatology[26,27]. Rubin has designed an expert system 'dermdx', intended to aid in the interpretation and diagnosis of biopsies of inflammatory diseases of the skin[28]. Meyer, Niedelman and Thomas have discussed the treatment of common skin diseases in infants and children[29,30]. These Expert Systems are specialized in one specific disease, but the current proposed expert system is specialized in the diagnosis of nine Urination diseases : Pyelonephritis, Kidney Stone, Bladder infection , Prostatitis, Urethritis, Gonorrhea, Interstitial cystitis, Stress incontinence, Trauma in kidney or bladder.

Akande Ruth et. al, developed a web-based expert system for diagnosis and management of kidney disease[5]. INTERNIST–I is one of the first clinical decision support systems have developed by Pople and Myers at the University of Pittsburgh in 1974 for diagnosing medical problems diagnostic complex general internal disease[24].

In fact my co-author of this paper have a good experience about some of the Urination diseases, where he was suffering from the symptoms of urinary tract infections since a period of time and now has some experience with the disease for frequently visiting doctors.

Research motivation

The main reason for this research work is to implement and design an expert system which is able to diagnose Urination diseases. Due to wrong Urination diseases diagnosis and treatment given to patients, now that Urination disease mortality is a growing public health problem it is based on this that we can see what has been done as far as Urination disease is concerned. It prompts the design of this expert system to eliminate the above problem, due to its characteristics such as quick, effective and accurate diagnosis and treatment of Urination diseases. The Urination diseases have a lot of common symptoms and many of them are very much alike, and that makes it very difficult even for a Urination doctor (specialist) to put a right diagnosis

Knowledge base of the Urination

Currently, our expert system covers the following urination diseases:

Pyelonephritis

Pyelonephritis is a kind of urinary tract infection where one or both kidneys become infected. They may be infected by bacteria or a virus. It may cause people to feel extremely ill and it needs handling

Symptoms of Pyelonephritis

At least half of women have experienced the discomfort with urination caused by a urinary tract infection: painful, urgent, or frequent urination.

Pyelonephritis may start with similar symptoms. However, once the infection has spread to the kidney, signs of more severe illness usually result. They include: Back pain or flank pain, Fever (usually present) or chills, Feeling sick (malaise) , Nausea and vomiting, Confusion (especially in the elderly).

Pyelonephritis may cause noticeable changes in the urine, such as: Blood in the urine (hematuria), Cloudy or foul-smelling urine, Pain when urinating, Increased frequency or urgency of urination.

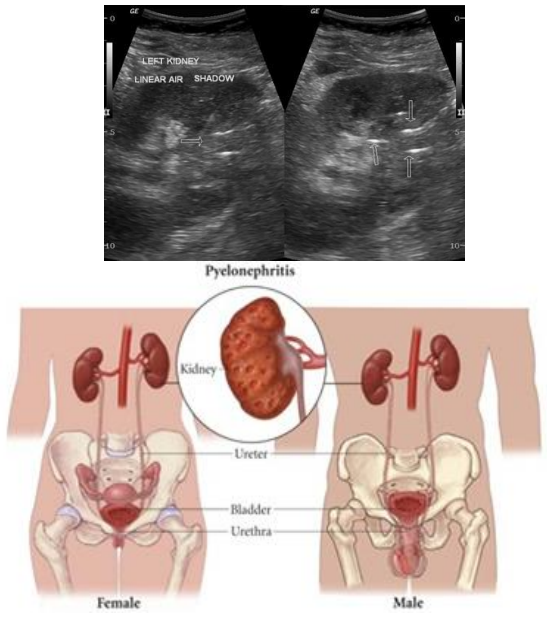

Figure 8: show Pyelonephritis

Bladder infections

Bladder infections are as well described as urinary tract infections. They may grow when bacteria go into the urethra and go up into bladder. The urethra is the pipe that get rid of urine from the body. Once bacteria go inside the urethra, they may stick to the walls of the bladder and grow rapidly. The resulting infection may cause uncomfortable symptoms such as sudden urges to urinate, pain while urinating, and abdominal cramping. These symptoms may be eased with a combination of medical and home treatments. Here are the most effective bladder infection remedies that one can try.

Symptoms of bladder infections like cystitis, include: a burning sensation when urinating which is the main common sign of a bladder infection, frequent urge to urinate, urine with a strong foul odor, bladder spasm, in the elderly: lethargy, incontinence, and/or mental confusion, in severe cases, these symptoms may be accompanied by fever and chills, abdominal pain or blood in the urine.

Prostatitis

The prostate is about the size of a walnut and situated among one's bladder and the base of his penis. Running through the middle of your prostate is the urethra. This is the pipe that moves about urine from bladder to one's penis, and semen from the sex glands to penis. The prostate is an essential part of the male reproductive system.

Prostate infection (prostatitis) happens when one's prostate and neighboring area turn into inflamed. There are several types of infection that may influence your prostate. Some men have no symptoms at all, while others report several, including strong pain.

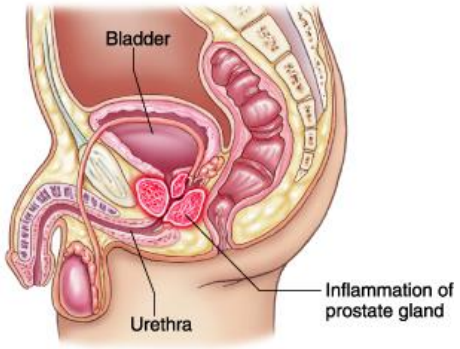

Fig 9: show prostatitis

The following are signs and symptoms that can exist with prostatitis : painful, difficult and/or frequent urinating, blood in the urine, groin pain, rectal pain, abdominal pain and/or low back pain, Fever and chills, Malaise and body aches, Yrethral discharge, Painful ejaculation or sexual dysfunction.

Gonorrhea

Gonorrhea is a sexually transmitted infection that is attributable to the bacterium Neisseria gonorrhoeae. The common symptoms in men are a burning feeling with urination and discharge from the penis. Women have no symptoms about half the time or have vaginal discharge and pelvic pain. In both men and women, if gonorrhea is left uncured, it can multiply locally, causing inflammation of the epididymis or pelvic inflammatory disease or all through the body, distressing joints and heart valves.

When women have symptoms, they usually experience: abdominal pain, bleeding between menstrual periods, fever, menstrual irregularities, painful intercourse, painful urination swelling or tenderness of the vulva, the urge to urinate more than usual, throwing up, yellowish or yellow-green vaginal discharge.

When men have symptoms, they normally experience: pus-like discharge from the penis, pain or burning feeling while urinating, more frequent urination than usual.

Interstitial cystitis

Interstitial cystitis is unsuccessfully understood bladder condition that causes long-term pelvic pain and problems with urination.

It's as well known as "painful bladder syndrome" or "bladder pain syndrome".

The condition be likely to first affect people in their thirties and forties, and is much more widespread in women than men.

It may have a significant impact on one's lifestyle, work, emotional health and relationships, but a number of dissimilar treatments may be tried to assist alleviate the symptoms.

Stress incontinence

Stress incontinence is the unpremeditated or unmanageable leakage of urine. In other words, the incapability to manage your urge to urinate in certain situation. It is a serious and awkward disorder, which may lead to social separation. Stress incontinence naturally occurs when certain types of physical movement puts pressure on the bladder. Laughing, sneezing, coughing, jumping, vigorous exercise, and heavy lifting may all cause stress incontinence. Any pressure placed on the abdomen and bladder may guide to the loss of urine.

If someone have stress incontinence, he/she can experience urine leakage when you: cough, sneeze, laugh, stand up, get out of a car, lift something heavy, exercise.

The main symptom of urinary incontinence is a problem controlling urination :

- Symptoms of stress incontinence: involuntary release of urine, especially when you cough, sneeze, or laugh, leaking a small to moderate amount of urine
- Symptoms of urge incontinence: frequent and sudden uncontrollable need to urinate, may leak a moderate to large amount of urine, although a small amount is possible.

Prostate Cancer

Only men have a prostate gland. The prostate is typically the size and shape of a walnut and enlarge as one get older. It is seated under the bladder and environs the urethra – the pipe men urinate and ejaculate through.

Not each person feels symptoms of prostate cancer. Repeatedly, signs of prostate cancer are first discovered by a doctor during a regular check-up.

A few men, on the other hand, may feel changes in urinary or sexual function that may show the presence of prostate cancer. These symptoms include: a need to urinate often, particularly at night, difficulty starting urination or holding back urine, weak or interrupted flow of urine, painful or

burning urination, difficulty in having an erection, painful ejaculation, blood in urine or semen, frequent pain or stiffness in the lower back, hips, or upper thighs.

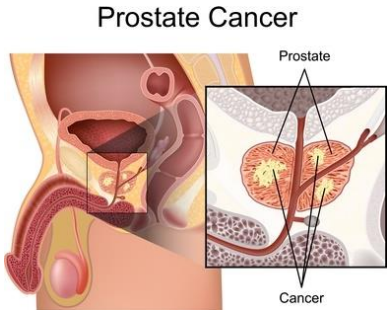

Fig 10: show prostate cancer

Material and Methods

Our expert System used the following decision tree to diagnoses urination problem (see figure 11). Figure 12 show the first screen when the expert system session start running. Figure 13 shows a sample question of type True/False during the dialogue between the expert system and the end user. Figure 14 shows the conclusion screen of the dialogue that consist of the expert system title, the diagnosis, and treatment.

SYMPTOMS		DIAGNOSIS		SELF-CARE
Begin Here				
1. Do you have pain or burning with urination?	**No**	**Go to Question 7.****		
Yes				
2. Is your urine cloudy?	**No**	**Go to Question 5.***		
Yes				
3. Do you have a fever and/or backache?	**Yes**	Pain and fever may be caused by an infection of the kidneys called **PYELONEPHRITIS**.		See your doctor right away.
No				
4. Do you have sharp, knife-like, intense pains in your back or groin?	**Yes**	You may have a **KIDNEY STONE** or another serious problem.		**EMERGENCY** See your doctor or go to the emergency room right away.
	No	You may have a **BLADDER INFECTION** or a more serious problem with the KIDNEYS.		See your doctor right away. Left untreated, problems with your kidneys may cause blood poisoning.
*5. Are you a man, and do you have an ache under your scrotum?	**Yes**	You may have **PROSTATITIS**, an infection of the prostate gland.		See your doctor.
No				

6. Are you a man, and do you have a discharge from the tip of your penis?	**Yes**	These may be symptoms of an INFECTION such as **URETHRITIS** or a **SEXUALLY TRANSMITTED INFECTION**, such as **GONORRHEA**.		See your doctor right away.
No				
**7. Do you have the urge to urinate after just using the restroom, and are you only urinating small amounts at a time?	**Yes**	Your symptoms may be caused by an infection in the bladder, called **CYSTITIS**, or from an irritation of the bladder, called **INTERSTITIAL CYSTITIS**, or from a **KIDNEY STONE** stuck in the bladder, or a chemical in the urine.		See your doctor.
No				
8. Are you producing more urine than usual?	**No**	**Go to Question 10.***		
Yes				
9. Have you been losing weight, drinking lots of fluids and/or have a history of diabetes in the family?	**Yes**	You may have **DIABETES**, a condition in which your body lacks insulin or doesn't use it in the right way.		See your doctor.
	No	You may be taking a medicine that can cause increased urination. Drinking liquids containing caffeine can also cause increased urination.		You may want to check with your doctor. If you drink caffeinated beverages, try decreasing the amount you drink.
***10. Are you a woman, and do you leak urine when you cough or sneeze?	**Yes**	Your symptoms may be from a weakness in the bladder due to childbirth or aging. This weakness causes **STRESS INCONTINENCE**.		Absorbent protection may be helpful. Kegel exercises may help strengthen muscles that support the bladder. See your doctor.
No				
11. Are you a man, and do you leak or dribble urine after you urinate, or do you have problems starting the urine stream, or do you wake many times at night to urinate?	**Yes**	You may have a problem with your **PROSTATE GLAND**. Your symptoms may be caused by a benign (non-cancerous) ENLARGEMENT or a more serious condition such as INFECTION or **CANCER**.		See your doctor.
No				
12. Do you have blood in your urine?	**Yes**	You may have a **KIDNEY STONE**, a TUMOR in the kidney or bladder, a **BLADDER INFECTION**, TRAUMA to your kidney, or possibly a		See your doctor right away.

BLEEDING DISORDER.

No

For more information, please talk to your doctor. If you think the problem is serious, call your doctor right away.

Fig 11: Decision Tree for Urination Diagnosis Expert System

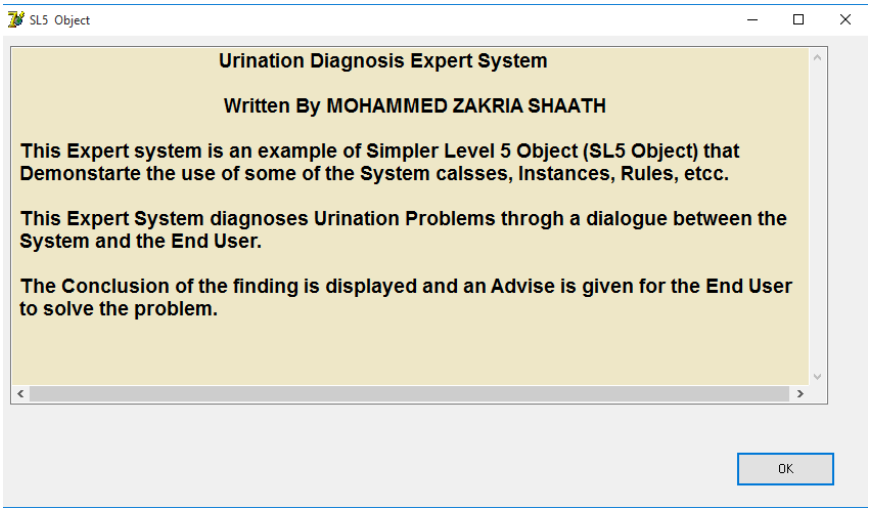

Fig 12: The first Screen shot of the expert Systems

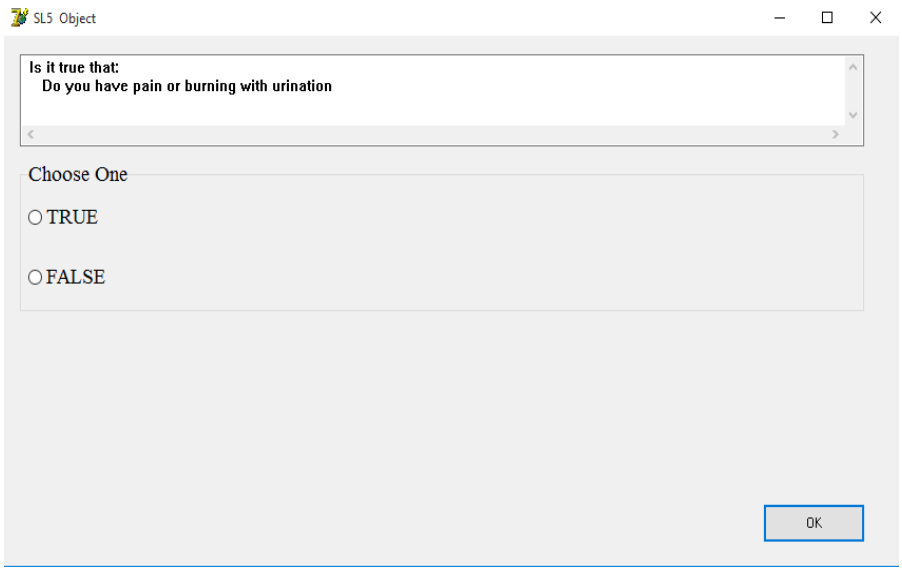

Fig 13: A sample question asked by the expert System

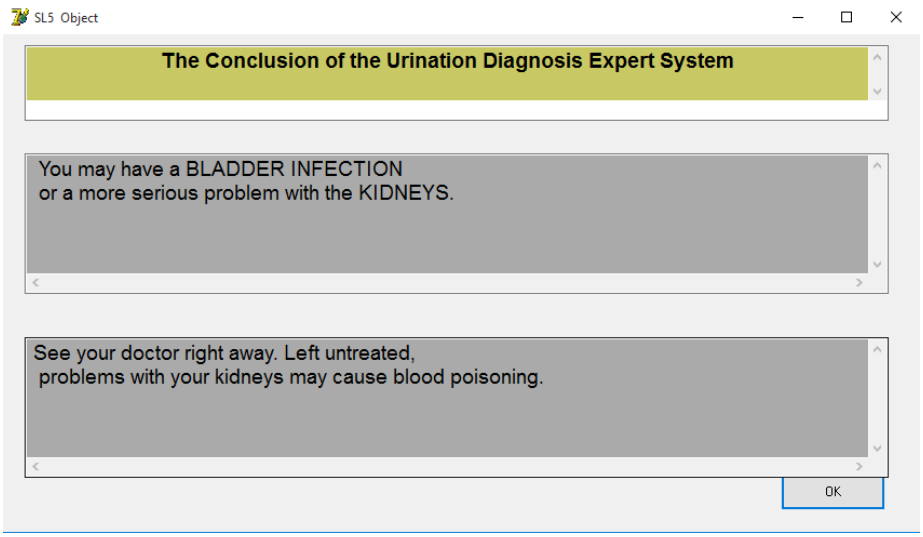

Fig 14: The conclusion of the expert system

Conclusion

In this paper, a new expert system was designed, developed and presented for assisting patients in diagnosing their urination problems. This expert system currently cover the following urination diseases: Pyelonephritis, Kidney Stone, Bladder infection, Prostatitis, Urethritis, Gonorrhea, Interstitial cystitis, Stress incontinence, and Trauma in kidney or bladder. Patients can get the diagnosis faster than the traditional way so they can save their time and effort. This expert system was developed using SL5 Object expert system language that have friendly user interface and patients can use this expert system easily without any difficulties.

Source code of the expert system

```
! Written By MOHAMMED ZAKARIA SHAATH
!
ATTRIBUTE Do you have pain or burning with urination SIMPLE
ATTRIBUTE Is your urine cloudy SIMPLE
ATTRIBUTE Do you have a fever and or backache SIMPLE
ATTRIBUTE Are you a man and do you have an ache under your scrotum SIMPLE
ATTRIBUTE Do you have the urge to urinate after just using the restroom and are you only urinating SIMPLE
ATTRIBUTE Do you have sharp knife like intense pains in your back or groin SIMPLE
ATTRIBUTE Are you a man and do you have a discharge from the tip of your penis SIMPLE
ATTRIBUTE Are you producing more urine than usual SIMPLE
ATTRIBUTE Have you been losing weight drinking lots of fluids and or have a history of diabetes in the family SIMPLE
ATTRIBUTE Are you a woman and do you leak urine when you cough or sneeze SIMPLE
ATTRIBUTE Do you have blood in your urine SIMPLE
ATTRIBUTE Are you a man and do you leak or dribble urine after you urinate or do you have problems starting the urine stream or do you wake many times at night to urinate SIMPLE
ATTRIBUTE start 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 := 750,999,199
  WITH justify IS left
  WITH font := "Times New Roman"
  WITH font style IS bold
  WITH font size := 14
  WITH text :="

        Urination Diagnosis Expert System
    Written By MOHAMMED ZAKRIA SHAATH

This Expert system is an example of Simpler Level 5 Object (SL5 Object) that
Demonstrate the use of some of the System classes, Instances, Rules, etc.

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

The Conclusion of the finding is displayed and an Advise 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 := 200,200,100
WITH justify IS center
WITH font := "Times New Roman"
WITH font style IS bold
WITH font size := 14
WITH text := " The Conclusion of the Urination Diagnosis Expert System"

INSTANCE problem textbox ISA textbox
WITH location := 20,110,800,130
WITH pen color := 0,0,0
WITH fill color := 170,170,170
WITH justify IS left
WITH font := "Arial"
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 := 170,170,170
WITH justify IS left
WITH font := "Arial"
WITH font size := 14
WITH text :=" --====--"

RULE R1
IF start
THEN ASK Do you have pain or burning with urination

RULE R2
IF Do you have pain or burning with urination
THEN ASK Is your urine cloudy
ELSE ASK Do you have the urge to urinate after just using the restroom and are you only urinating

RULE R2
IF Is your urine cloudy
THEN ASK Do you have a fever and or backache
ELSE ASK Are you a man and do you have an ache under your scrotum

RULE R3
IF Do you have a fever and or backache
THEN text OF problem textbox := " Pain and fever may be caused by an infection
of the kidneys called PYELONEPHRITIS. "
AND text OF advise textbox := "See your doctor right away. "
AND exit OF the application := TRUE
ELSE ASK Do you have sharp knife like intense pains in your back or groin

RULE R4
IF Do you have sharp knife like intense pains in your back or groin
THEN text OF problem textbox := " You may have a KIDNEY STONE or another serious problem. "
AND text OF advise textbox := "EMERGENCY See your doctor or go to the emergency room right away. "
AND exit OF the application := TRUE
ELSE text OF problem textbox := " You may have a BLADDER INFECTION or a more serious problem with the KIDNEYS. "
AND text OF advise textbox := "See your doctor right away. Left untreated, problems with your kidneys may cause blood poisoning. "
AND exit OF the application := TRUE

RULE R5
IF Are you a man and do you have an ache under your scrotum
THEN text OF problem textbox := " You may have PROSTATITIS, an infection of the prostate gland. "
AND text OF advise textbox := "See your doctor. "
AND exit OF the application := TRUE
ELSE ASK Are you a man and do you have a discharge from the tip of your penis

RULE R6
IF Are you a man and do you have a discharge from the tip of your penis
THEN text OF problem textbox := " These may be symptoms of an INFECTION such as URETHRITIS or a SEXUALLY TRANSMITTED INFECTION, such as GONORRHEA. "
AND text OF advise textbox := "See your doctor right away. "
AND exit OF the application := TRUE
ELSE ASK Do you have the urge to urinate after just using the restroom and are you only urinating

RULE R7
IF Do you have the urge to urinate after just using the restroom and are you only urinating
THEN text OF problem textbox := " Your symptoms may be caused by an infection in the bladder, called CYSTITIS, or from an irritation of the bladder, called INTERSTITIAL CYSTITIS, or from a KIDNEY STONE stuck in the bladder, or a chemical in the urine. "
AND text OF advise textbox := "See your doctor "
AND exit OF the application := TRUE
ELSE ASK Are you producing more urine than usual

RULE R8
IF Are you producing more urine than usual
THEN ASK Have you been losing weight drinking lots of fluids and or have a history of diabetes in the family
ELSE ASK Are you a woman and do you leak urine when you cough or sneeze

RULE R9
IF Have you been losing weight drinking lots of fluids and or have a history of diabetes in the family
THEN text OF problem textbox := " You may have DIABETES, a condition in which
your body lacks insulin or doesn't use it in the right way. "
AND text OF advise textbox := "See your doctor "
AND exit OF the application := TRUE
ELSE text OF problem textbox := " You may be taking a medicine that can cause increased urination. Drinking liquids containing caffeine can also cause increased urination. "
AND text OF advise textbox := "You may want to check with your doctor. If you drink caffeinated beverages, try decreasing the amount you drink. "
AND exit OF the application := TRUE

RULE R10
IF Are you a woman and do you leak urine when you cough or sneeze
THEN text OF problem textbox := " Your symptoms may be from a weakness in the bladder
due to childbirth or aging. This weakness causes STRESS INCONTINENCE. "
AND text OF advise textbox := "Absorbent protection may be helpful. Kegel exercises may help strengthen muscles that support the bladder. See your doctor. "
AND exit OF the application := TRUE
ELSE ASK Are you a man and do you leak or dribble urine after you urinate or do you have problems starting the urine stream

RULE R11
IF Are you a man and do you leak or dribble urine after you urinate or do you have problems starting the urine stream or do you wake many times at night to urinate
THEN text OF problem textbox := " You may have a problem with your PROSTATE GLAND. Your symptoms may be caused by a benign non-cancerous ENLARGEMENT a more serious condition such as INFECTION or CANCER. "
AND text OF advise textbox := " See your doctor. "
AND exit OF the application := TRUE
ELSE ASK Do you have blood in your urine

RULE R12
IF Do you have blood in your urine
THEN text OF problem textbox := " You may have a KIDNEY STONE, a TUMOR in the kidney or bladder, a BLADDER INFECTION, TRAUMA to your kidney, or possibly a BLEEDING DISORDER. "
AND text OF advise textbox := "See your doctor right away. "
AND exit OF the application := TRUE
ELSE
text OF problem textbox := " For more information, please talk to your doctor. If you think the problem is serious, call your doctor right away. "
AND text OF advise textbox := " "

END

References

1. Abu Naser S.S, and Akkila A. N., 2008, A Proposed Expert System for Skin Diseases Diagnosis. INSInet Publication, Journal of Applied Sciences Research. 2008; 4(12): 1682-1693.
2. Abu Naser S.S., SL5 Object: the Simpler Level 5 Object Expert System Language, International Journal of Soft Computing, Mathematics and Control (IJSCMC). 2015; 4(4) ,25-37.
3. http://www.mayoclinic.org/ . Date visited 1-3-2016.
4. http://familydoctor.org/familydoctor/en/health-tools/search-by-symptom/mouth-problems-infants-children.html, Date visited 1-3-2016.
5. http://www.expertise2go.com/webesie/e2gdoc/e2gmod2.htm
6. Abu Naser S.S, and Ola A.Z. An expert system for diagnosing eye diseases using Clips. Journal of Theoretical and Applied Information Technology, 2008;4 (10). Available: http://www.jatit.org/volumes/research-papers/Vol4No10/5Vol4No10.pdf
7. Abu Naser S.S, Baraka M., and Baraka A. A Proposed Expert System For Guiding Freshman Students In Selecting A Major In Al-Azhar University, Gaza, Journal of Theoretical and Applied Information Technology. 2008;4(9):889-893. Available: http://www.jatit.org/volumes/research-papers/Vol4No9/15Vol4No9.pdf
8. Abu Naser S.S, Kashkash K., and Fayyad M. Developing an Expert System for Plant Disease Diagnosis, Journal of Theoretical and Applied Information Technology. 2008; 1(2):78-85. Available: http://scialert.net/abstract/?doi=jai.2008.78.85
9. Wikipedia, https://en.wikipedia.org/wiki/Ligament, Accessed 3 March 2016.
10. Abu Naser S.S, and ALmursheidi S. A Knowledge Based System for Neck Pain Diagnosis, World Wide Journal of Multidisciplinary Research and Development(WWJMRD). 2016; 2(4):12-18. Available : http://wwjmrd.com/vol%202/issue%204/pdf/13.2.pdf
11. Durkin, J., 1994. Expert Systems: Design and Development, ISBN 0-02-330970-9, Prentice Hall, Englewood Cliffs, N.J.
12. Giarratano, J. and G. Riley, 2004. Expert Systems: Principles and Programming, Fourth Edition. Boston, MA, Thomson/PWS Publishing Company. ISBN: 0534937446.
13. Talayeh Tabibi. 2012. An Expert System for Diabetes Diagnosis, American Academic & Scholarly Research Journal.
14. Russell, S. and P. Norvig, 2002. Artificial Intelligence: A Modern Approach, Prentice Hall, Englewood Cliffs, NJ, Second Edition. ISBN 0-13-103805-2.
15. Abu Naser S.S, El-Hissi H, Abu-Rass M, El-Khozondar N, An expert system for endocrine diagnosis and treatments using JESS, Journal of Artificial Intelligence, 2010; 3(4), 239-251,.
16. Abu Naser S.S, Al-Dahdooh R., Mushtaha A., El-Naffar M., Knowledge Management in ESMDA: Expert System for Medical Diagnostic Assistance, AIML Journal, 2010.
17. Abu Naser S.S, Kashkash K, Fayyad M. Developing an Expert System for Plant Disease Diagnosis, Journal of Theoretical and Applied Information Technology. 2008; 1(2).
18. Abu Naser S.S, Alhabbash M., Male Infertility Expert system Diagnoses and Treatment, American Journal of Innovative Research and Applied Sciences. 2016; 2(4).
19. Abu Naser S.S, Mahdi, A., A proposed Expert System for Foot Diseases Diagnosis, American Journal of Innovative Research and Applied Sciences. 2016; 2(4).
20. Abu Naser S.S, and AlDahdooh R. Lower Back Pain Expert System Diagnosis and Treatment, Journal of Multidisciplinary Engineering Science Studies(JMESS), 2016; 2(4).
21. Abu Naser S.S, and Hamed A. M. An Expert System for Mouth Problems in Infants and Children, Journal of Multidisciplinary Engineering Science Studies(JMESS), 2016; 2(4).
22. Abu Naser S.S, and. Abu Hasanein H. Ear Diseases Diagnosis Expert System Using SL5 Object. World Wide Journal of Multidisciplinary Research and

Development(WWJMRD). 2016; 2(4):41-47. http://wwjmrd.com/vol%202/issue%204/pdf/18.1.pdf
23. Azaab S., Abu Naser S.S, Sulisel O.. A proposed expert system for selecting exploratory factor analysis procedures. Journal of the college of education. 2000; 4 (2), 9-2
24. Randolph A. Miller, et al., "INTERNIST-1: An Experimental Computer-Based Diagnostic Consultant for General Internal Medicine," New England Journal of Medicine 307 (August 19, 1982): 468-76.
25. Buchanan, B.G.; Shortliffe, E.H. (1984). Rule Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project. Reading, MA: Addison-Wesley. ISBN 978-0-201-10172-0.
26. Yoon, Y., R., P. Brobst, Bergstresser and L. Peterson, 1990. Computer-Based Medical Systems, Proceedings of Third Annual IEEE Symposium on Volume, 3-6: 306-312.
27. Wollina, U., 2005 Common skin diseases: uncommon presentations. Clinics in Dermatology, 23(5):443-445. doi:10.1016/ j.clindermatol. 2005. 01. 001.
28. Rubin, A., 2007. Design of an expert system and its application to dermatopathology, 21(3): 269-274, D O I: 10 .1 1 1 1 /j.1 3 6 5 -25 5 9 .1992.tb00386.x, http:// dx.doi.org/ 1 0 . 1 1 11/ j . 1365- 2559.1992.tb00386.x
29. Meyer, M. and L. Niedelman, 2006. Treatment of common skin diseases in infants and children, The J o urnal of P e d ia tr ics, 32 (5): 56 6 -5 79, doi:10.1016/S0022-3476(48) 80180-0.
30. Thomas, A., V., Quirina, F. Steven, R. Feldman and Q. Sara, 2006. Treating Skin Disease: SelfManagement Behaviors of Latino Farm workers. Journal of Agromedicine: 11(2): 27-35, DOI: 10.1300/J096v11n02-06.
31. Abu Naser S.S, and El Haddad I. An Expert System for Genital Problems in Infants, World Wide Journal of Multidisciplinary Research and Development(WWJMRD). 2016; 2(5).
32. Abu Naser S.S, and Bastami B. A Proposed Rule Based System for Breasts Cancer Diagnosis. World Wide Journal of Multidisciplinary Research and Development(WWJMRD). 2016; 2(5).
33. Abu Naser S.S, and Hilles M. An Expert System for Shoulder Problems Using CLIPS. World Wide Journal of Multidisciplinary Research and Development(WWJMRD). 2016; 2(5).