Computation of inheritance share in islamic law by an expert system using decision tables

Huda F. AL-Shahad and Zeina AbdAl-Retha
Department of Computer, Collage of Science, University of Kerbala, Iraq
Received Date: 2/Aug/2015
Accepted Date: 3/Sep/2015

الخلاصة

نظام الارث من الانظمة الاسلامية المهمة التي تهتم بتركة المتوفي وتوزيعها بالاعتماد على القران الكريم، يعتمد توزيع التركة على الحالة الاجتماعية للمتوفي وعلى درجة القرابة للورثة، يتناول هذا البحث استخدام فكرة جداول القرارات في توزيع الارث التي يمكن استخدامها من قبل القاضي او اي طرف مستفيد لتحديد الوارثين وكيفية توريث كل منهم وذلك حسب استحقاقه في قانون الاحوال الشخصية العراقي.

شملت هذه الجداول الورثة من الدرجة الاولى والثانية ولغرض تبسيط هذه الجداول فقد اخذ بنظر الاعتبار في تصميمها هيكلة هذه الجداول بحيث يشمل التصميم جدول رئيسي يتفرع الى جداول فرعية وهذه بدورها تتفرع الى جداول فرعية أخرى وهكذا حسب حالات التركة. هذه الجداول تستخدم كقاعدة معرفة للنظام الخبير حيث تستخدم المعلومات كحقائق ثابته.

الكلمات المفتاحية

نظام الخبير، ورثة، حصة تركة، قاعدة المعرفة، التراث.

Abstract

The legacy system is important Islamic sciences that are interested of the legacy of the dead and all deserve have enacted laws of the Book of Allah (Quran), it is depending on the social state of the dead and the relation of heirs with the dead. An origin of huge discussion, both inside and outside the Muslim group is the Islamic law of legacy. This research deals with the use of decision Tables in distribution of an inheritance that can use by the judge or anyone that need to know how to compute the share according to Iraqi Personal Status Law.

The Tables consist of the first and second relation heirs, for the purpose of simplifying these Tables were taking into consideration the organizing of these Tables. The main Table isolated into sub-Tables, which additionally branch out to other sub-Tables as legacy cases. The Tables are the knowledge base of the expert system that take the information on it and then make it as the fact in the rule base.

In this research the user input the information about the dead as an answer of expert questions, according to these answers the system moves to sub-decision Table. The decision Tables contain all the information that the user need, after the questions finish and the information use as the facts of the expert system then the share of the user appear according the Holy Quran.

Keywords

Expert System, Heirs, Inheritance Share, Knowledge Base, Legacy.

1. Introduction

Inheritance is the transmission the legacy of the dead person to the successor of the children or grandchildren or kinship. Upon the death of the person is the distribution of the estate (movable and immovable property of the deceased) to his heirs in accordance with the personal status law or by Iraqi views and jurisprudence own doctrine of the dead (within Islamic jurisprudence), which are referenced as appropriate.

The subject of inheritance is very large and complex, it depends on the social situation of inherited or dead and some neighborhoods on the degree of inheritors. Sometimes the shares are computed or distributed in a wrong way, so the idea of design the decision Tables and use it in expert system were simplified the way to distribute of the share in a perfect way [1].

An Artificial Intelligence System (AI) is found to solve many problems in life, it contains a special domain that is called expert system. An expert system is a machine program that simulates the judgment and conduct of a human or an association that has expert knowledge and experience in a specific field [2]. The way that prompts the advancement of expert system is unique in relation to that of accepted programming methods. The idea for expert system development come from the subject domain of AI, and obliges a flight from routine figuring practices and programming procedures [3].

2. Motivation

There are several attempts to mechanize some aspects of the distribution of inheritance and programmed on a computer. C. CRAIG, et. al explained in 1991 how can the children benefit from their parents' legacy by a design SELF prototype system that uses interpreting an object's parent as shared parts of the object. They deal with the unordered and ordered multiple inheritance and how to send it in unique sender path to simplify the work [4]. S. Nadia in 2003 showed the women's property and inheritance rights only, she discussed the complexity that the woman's face when the national law is growing so she suggested the development of strategy on women's rights in the United States to insure her share [5]. N. Zaini, et. al discussed in 2012 the distribution of Inheritance according two factors, Islamic low and the legacy of the dead. It takes the share in different Muslim community and compares it with the court and the challenge faced Sharia law. The research discusses the inheritance in three countries as a case study: Beaufort, Sabah and Malaysia [6].

In this research the idea of decision Tables was used for the purposes of calculating the distribution of the estate and heirs shares so as to help the judges in determining the rights of the heirs, according to his Iraqi al-Shara, the expert system uses these Tables as facts for calculating shares of heirs correctly.

The next section covers the expert system structure and information about each component and section 3 discusss the proposed system, the definition of decision Table and how to build it. In section 4 the result of the expert system is shown as a number of forms.

3. Methodology and components

The PC program that addresses and reasons with learning of any power subject with a point of view to handling issues or giving direction is an expert system.

Expert system needs to take care of issues

effective access to significant area knowledge base, and a thinking system to apply the information to the issues they are given. Typically, they will additionally need to have the capacity to clarify, to the users who depend on them, how they have arrived at their choices. They will for the most part expand upon the thoughts of knowledge representation, creation leads, hunt, et cetera, that we have effectively secured.

The expert system consists of four components knowledge base, Rule base, Inference Engine and user interface as shown in fig. 1 [7].

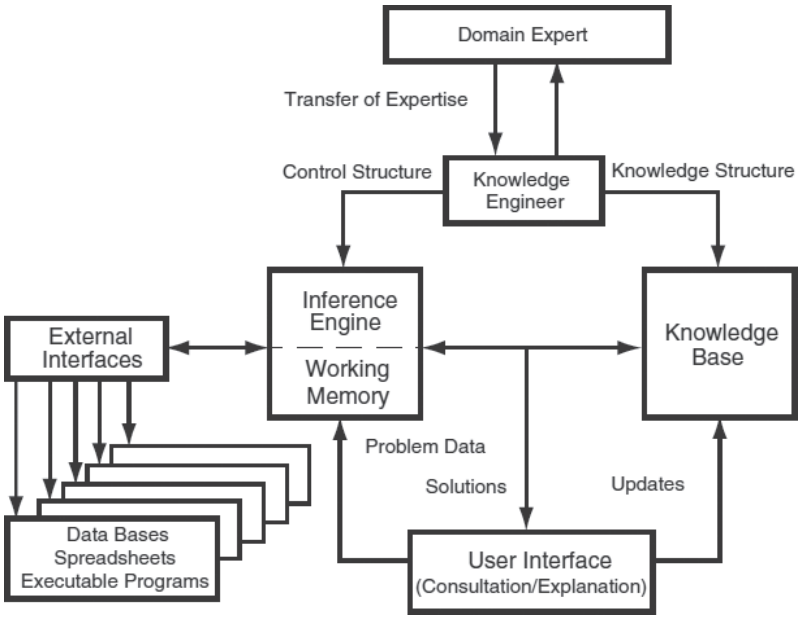


Fig. (1): Expert system components

3. 1. Knowledge base

The knowledge base contains the area particular information needed to solve the problem. The knowledge base is made by the knowledge engineer, who conducts a progression of meetings with the expert and arranges the learning in a frame that can be directly utilized by the framework. The knowledge engineer needs to have the learning of KBES (knowledge base of expert system) innovation and ought to know how to add to a specialist framework utilizing an improvement domain or expert system advancement shell. It is a bit much that the information designer be capable in the area in which the expert system is being produced. Be that as it may, a general learning and nature with the key terms utilized as a part of the area is constantly attractive, since this won't just help in better comprehension the space information however will likewise decrease the corresponding hole between the knowledge engineer and the expert. Before deciding on the structure of the knowledge base, the knowledge engineer ought to have a reasonable thought of diverse knowledge representation plans and the suitability of each under distinctive circumstances [2].

3. 2. Rule base

The rule base is the number of rules which represents the knowledge about the domain. The general type of a rule is:

If cond1

and cond2

and cond3

...

then action1, action2,...

The conditions cond1, cond2, cond3, etc. are evaluated based on what is the information known about the problem to be solved (i. e., the substance of the working memory). A few systems would permit disintersections in the precursors. For example, rules like the accompanying would be permitted [9].

If cond1

and cond2

or cond3

...

then action1, action2,...

3. 3. Inference engine

The actuation engine involves working precepts and principles. It uses a knowledge base to choose decisions. Following are the steps that are followed to produce the final output [diagnostic]. An understanding of the derivation standard idea is imperative to comprehend expert systems. The rules are entered as partitioned standards and it is the induction motor that uses them together to reach inferences. Since each one standard is a unit, principles may be erased or included without influencing different guidelines. One point of inference rules of surmising administers over conventional writing computer programs is that deduction rules use thinking which all the more nearly look like human thinking. Therefore, when a conclusion is drawn, it is conceivable to see how this conclusion was arrived at. Besides, on the grounds that the expert system employments. Learning in a structure like the expert, it may be simpler to recover this data from the expert [8].

3. 4. The user interface

The user interface is the method for correspondence between a user and the expert system critical thinking methods. A decent expert system is not exceptionally helpful unless it has a successful interface. It must have the capacity to acknowledge the inquiries or directions in a structure that the user enters and make an interpretation of them into working guidelines for whatever remains on the system. It likewise must have the capacity to decipher the replies, created by the system, into a structure that the user can comprehend, Careful consideration ought to be given to the screen outline so as to make the expert system seem “well disposed” to the user [9].

5. Proposed expert system and decision Table

The proposed expert system is designed to calculate the share of each person that relates to the dead in first degree relation such as son, daughter, wife, husband, father and mother. The fig. 2 shows the proposed steps of the system.

At the point when a Muslim dies, there are four duties which need to be performed. These are:

1. Payment of memorial service costs
2. Payment of his/her obligations
3. Execution his/her will
4. Distribution of remaining home amongst the beneficiaries as indicated by Sharia.

When the person is dead, the first task is to determine which of the relatives of the deceased are entitled to inherit and secondly, to determine the quantum share entitlement of each of the

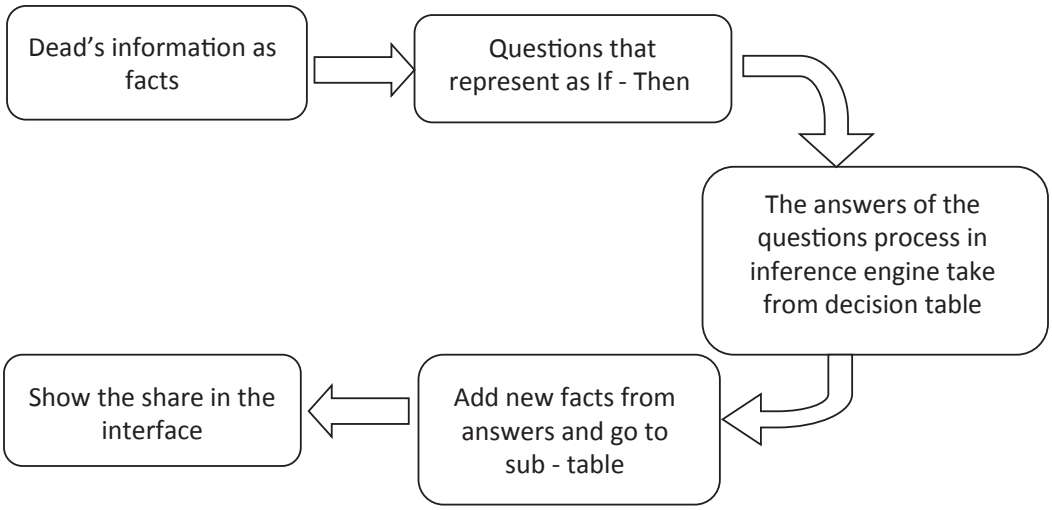
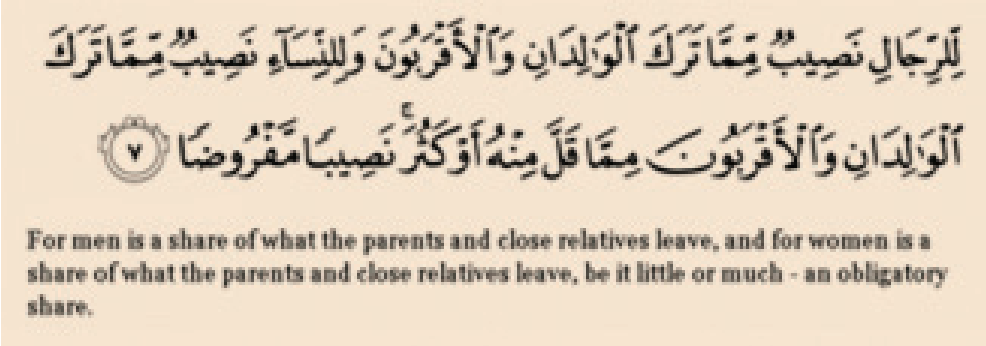


Fig. (2): Proposed system steps

heirs concerned. Muslim inherits from each other is proven from the Quran [10]:

"4:7 There is a share for men and a share for women from what is left by parents and those


لِّلرِّجَالِ نَصِيبٌ مِّمَّا تَرَكَ ٱلْوَٰلِدَانِ وَٱلْأَقْرَبُونَ وَلِلنِّسَآءِ نَصِيبٌ مِّمَّا تَرَكَ
ٱلْوَٰلِدَانِ وَٱلْأَقْرَبُونَ مِمَّا قَلَّ مِنْهُ أَوْ كَثُرَ ۚ نَصِيبًا مَّفْرُوضًا ۝٧

For men is a share of what the parents and close relatives leave, and for women is a share of what the parents and close relatives leave, be it little or much - an obligatory share.

Fig. (3): An-Nisa

nearest related, whether, the property be small or large–a legal share. "[An-Nisa 4:7]

4. 1. Decision Table designed

Decision Table contains a set of condition's cases which produces a set of procedures to cover all possibilities it depends on the condition and it's answer requirement. The Table consists of two parts: First part, describe the conditions and range of cases that can be met by these conditions. The second part, describes all the measures that must be taken and selection of actions to be taken at the incidence of the different conditions. The number of rules in the Table covers all possibilities meeting the conditions and according to the relationship between the number of conditions and the number of rules 2x (where x is the number of conditions). In other words, each condition adds to the Table lead to double the number of rules, leading to the presence of a large number rules in the Table. For example, if the number of cases of the condition is 8 then there are 256 rules which affects the facility refer to the Table and uses it, therefore there were a number of methods to simplify the Table, including:

1. Combination rules: If the Table has two rules containing the same procedures and rules

were identical in terms except for one condition then these rule are integrated as a single rule.

2. Use a base of else rule: if there was several groups of cases of the condition lead to the same result, then the actions of these groups can be integrated into a single base using the base else rule.

4. 2. The use of Tables

Table inheritance is used to determine the heirs and their shares of the legacy by reference to the first Table and in the light of the condition of existing cases of the Table indicates a particular reference to the sub-Table and so on.

Example: the case of the fact that the dead is male, married, has no children, the wife, father and mother are alive, and has a number of brothers and sisters.

It is clear from the Table (1) that the case of example apply to the rule no. 5, and as a result track this rule sets the Table share a wife is ¼ from a legacy and then indicates reference to the sub-Table to find out the rest of the heirs quotas. When you return to the Table (2) shows the applicability of the rule of it (the mother alive, Grandma if she was alive or not, and the number of deceased brothers and sisters) in this rule sets the Table identifies the mother's share is 1/6 of the estate and the father rest of the estate after the share of wife and mother.

Table (1): Main information about dead

حالات الشرط	١	٢	٣	٤	٥	٦	٧	٨	٩	١٠	١١	١٢	١٣	١٤
المتوفى ذكر	ن	ن	–	–	ن	ن	–	–	ك	ك	ك	ك	–	–
المتوفى متزوج	ن	ن	ن	ن	ن	ن	ن	ك	ن	ن	ن	ن	ن	ك
لديه اولاد	ن	ن	ن	ن	ك	ك	ك	–	ن	ن	ك	ك	ك	–
الزوج على قيد الحياة	ن	ن	ك	ك	ن	ن	ك	–	ن	ن	ن	ن	ك	–
الاب على قيد الحياة	ن	ك	ن	ك	ن	ك	ن	ن	ن	ك	ن	ك	ك	ك
حصةالزوجة	٨\١ ت	٨\١ ت	–	–	٤\١ ت	٤\١ ت	–	–	–	–	–	–	–	–
حصة الزوج	–	–	–	–	–	–	–	–	٤\١ ت	٤\١ ت	٢\١ ت	٢\١ ت	–	–
حصص بقية الورثة	ج ١-١	ج ١-٢	ج ١-١	ج ١-٢	ج ١-٣	ج ١-٥	ج ١-٦	ج ١-٦	ج ١-١	ج ١-٢	ج ١-٣	ج ١-٥	ج ١-٧	ج ١-٧

Table (2): The branch table from main table

حالات الشرط	١	٢	٣	٤
الام على قيد الحياة	ن	ن	ك	ك
الجدة ام الام على قيد الحياة	–	–	ن	ك
للمتوفي عدد من الاخوة والاخوات	ن	ك	–	–
حصة الام	١\٦ ت	تستحق الام ثلث الباقي بعد نصيب احد الزوجين	–	–
حصة الجدة ام الام	–	–	٦\١ ت	–
حصة الاب	باقي التركة بعد نصيب احد الزوجين والام	باقي التركة بعد نصيب احد الزوجين والام	باقي التركة بعد نصيب احد الزوجين والجدة	باقي التركة بعد نصيب احد الزوجين

6. Results

In this research, we had taken kins only from first grade and second grade. The first Table has the information or questions about the dead (the sex, if married or not, has children or not... etc..) as shown in Fig. 3.

Fig. (3): Dead information

`When the user chooses the answers from the above Fig., other questions appear in a new form, the questions belongs to the children of the dead (if there is one son or more, one girl or more, if there

is any child dead and so on) the user is also must choose one of the three answers as shown in Fig. 4.

When the answering part is finished, the share must compute not only for the mother or father, but there is Ashab-ul-Furud (heirs with fixed shares) they must have their share, Fig. 5 shows

Fig. (4): Child's dead information

the share of them that appears as a message box in the program.

Finally, the share of everyone that stays alive will be computed and the user will use it in a simple way as shown in Fig. 6.

Many cases are taken in on this system, another

Fig. (5): Ashab-UL-Furud

case is if the dead doesn't have children and his mother is alive, so the share of her is 1/3 but if he has brothers then the share of her will be 1/6 and so on.

6. Conclusion

In general the use of the Table is much easier than read texts and on this basis the Table format

Fig. (6): Final share

was adopted in the announcement of the dates of trains and planes, as well as the idea of the multiplication Table in the course of primary schooling. Therefore the maturity of the heirs of the inheritance in the Tables according to the different cases of inheritance simplifies the calculation of the heir's rights and reduces from falling into the wrong distribution of inheritance and how much. These Tables provide ease of judges that make it an appropriate means within the reach of their hand, they can refer to it easily and using an expert system to compute the share made the process very simple and the result appears clearly without errors and in a fast way.

References

[1] Mohd R.,The Islamic Inheritance Law (FARAID): The Manifestatioin of Comprehensive Inheritance Management In Islam. National Convention of Faraid and Hibah, Malaysia (2008).

[2] Thomas P., Wealth and Inheritance in the Long Run Handbook of Income Distribution, Volume 2,. Elsevier B.V., London, UK. 1368 (2013).

[3] Durkin, J. Research Review, Ohio Journal of Science., **5**, 171 (1990).

[4] CRAIG C., David U., Bay-wei C. and Urs H., Parents are Shared Parts of Objects: Inheritance and Encapsulation in SELF. An International Journal, Kluwer Academic Publishers, California (1991).

[5] Nadia S., Women's Property and Inheritance Rights:Improving Lives in a Changing Time. International Center for Research on Women Academy for Educational Development U.S. (2003).

[6] Zaini N., Hayatullah L., Zuliza M. and Amir H., International Business Management, **6**, 228 (2012).

[7] Adedeji B., John Y., Fuzzy Engineering Expert Systems with Neural Network Application. John Wiley and Sons, New York. 289 (2002).

[8] Sasikumar M., A Practical Introduction to Rule Based Expert Systems. Narosa Publishing House, New Delhi (2007).

[9] Race A., Zahra A., Advances in Environmental Biology, **7** (8): 1460 (2013).

[10] The Nobil Quran, www.quran.com (2015).