

# ATTORNEY 209: A Virtual Assistant Adviser for Family-Based Cases

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**Abstract**—This paper introduces ATTORNEY 209: A Virtual Assistant Adviser for Family-Based Cases. It is a conversational chatbot which is designed to handle initial assessment for families who need legal guidance regarding family cases such as child custody and legal separation. Chart Parsing Algorithm, known in Natural Language Processing, is the approach implemented in this study. It is suitable for ambiguous grammar and uses the dynamic programming approach—partial hypothesized results are stored in a structure called a chart and can be re-used. This eliminates backtracking and prevents a combinatorial explosion.

**Index Terms**—chatbot, chart parsing algorithm, natural language processing

## I. INTRODUCTION

While computers have long been a fixture in the legal profession, they have mainly been relegated to back office tasks, such as billing, word processing, and other basic administrative duties. As Artificial Intelligence (AI) technology develops, the creation of computer software that can autonomously determine legal solutions is slowly becoming a reality.

Ref. [1] AI programs that achieve expert-level competence in solving problems in task areas by bringing to bear a body of knowledge about specific tasks are called knowledge-based or expert systems.

Ref. [2] "An Expert system is an intelligent system that has been constructed in such a way that it is capable of functioning at the standard of human experts in given fields that embody a depth and richness of knowledge that permits them to perform at the level of an expert". The growth of expert systems is expected to continue for several years. With the continuing growth, many new and exciting applications will emerge such as Legal Expert System. Ref. [3] A legal expert system is "a system capable of performing at a level expected of a lawyer".

Some expert systems use a chatter robot prominently known as chatbot. Chatbot was designed to generally simulate conversation and entertain the user. Two of the

most famous existing chatbot are ELIZA which was created in the 60's by Joseph Weizenbaum to emulate a psychotherapist in clinical treatment. The idea was simple and based on keyword matching. On the other hand, A.L.I.C.E inspired by ELIZA was built basically to entertain users and talk to them as a real person. However, the program is unable to pass the Turing test.

Today, the most popular chatbot widely use is the Cleverbot. Ref. [4] It is a web application that uses an artificial intelligence algorithm to hold conversations with humans unlike other chatterbots, Cleverbot's responses are not programmed into it, but rather selected from phrases entered by humans in previous conversations. Ref. [5] In the work by Aguilar, Berbos, Comendador, Sagum, and Cayube they developed an expert system in the field of law such as PHILEX: Philippine Land Law Expert Chatbot but its focus is mainly on Land Law in the Philippines.

Many studies exist regarding legal expert system but none of them includes a conversational chatbot that would give guidance about family based cases such as legal separation and child custody. It also shows that most of the algorithm used was limited to a pattern matching response. Therefore the researchers developed ATTORNEY 209: A Virtual Assistant Adviser for Family-Based Cases, it is an expert system that mimics a real life lawyer and gives legal advices. It is a conversational chatbot which is designed to handle initial assessment for families who need legal guidance regarding family cases such as child custody and legal separation. Chart Parsing Algorithm, known in Natural Language Processing, is the approach implemented in this study. It is suitable for ambiguous grammar and uses the dynamic programming approach—partial hypothesized results are stored in a structure called a chart and can be re-used. Ref. [6] This eliminates backtracking and prevents a combinatorial explosion. In addition to that, the system includes the used of term frequency-inverse document frequency or  $tf*idf$  weight and singular value decomposition(SVD). Ref. [7]  $Tf*idf$  weight is a numerical statistic which reflects how important a word is to a document in a collection or corpus and Ref. [8] the latter is a factorization of a real or

complex matrix, with many useful applications in signal processing and statistics.

## II. DEVELOPED SYSTEM

The system is developed using Visual C# as its front-end and MS SQL as its back-end. It is intended to run on a stand-alone computer and it is not a web-based system. It provides legal advice and answers for queries of the user. Moreover, the system accepts input and generates output in textual form. It can detect misspelled terms. However it can only recognize English words.

### A. System Architecture

In the initialization of the system, the user is allowed to select whether he wants to view first the frequently asked questions or immediately proceed to the conversation with the chatbot. Once the conversation starts, the user can input his query. The system will then process the data. Chart Parsing Algorithm is used in order to parse the words, to be able to understand the meaning of the query, Term Frequency–Inverse Document Frequency and Singular Value Decomposition is implemented. Once the query is understood, it will then fetch suitable advice from the Knowledge-Base of the system. The content of the Knowledge-Base are the information based on the Family Code of the Philippines. The system architecture is designed as described in Fig. 1.

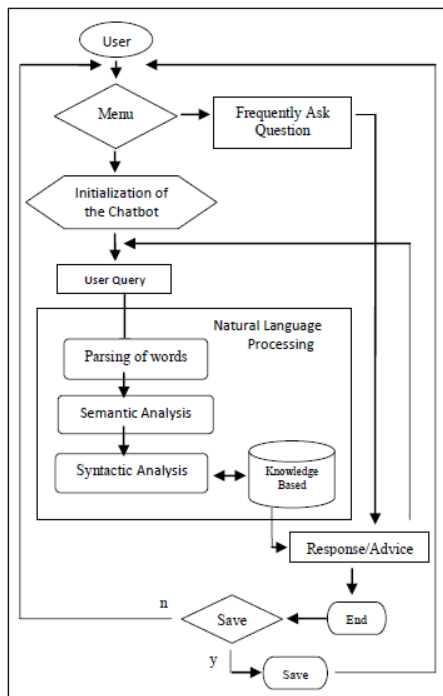


Figure 1. System Architecture

### B. Software

The researchers provide different interfaces where the users can interact with our system such as the main menu where the user can choose whether he wants to view the instructions on how to use the system, view the frequently asked question or immediately proceed to the conversation with the chatbot. Fig. 2 shows the prototype

of the interface where the user can choose whether to view: the instructions from the help button, the frequently asked questions (FAQ) or directly proceed to the chatbot.

Fig. 3 shows the prototype of the interface where the users can view the instructions on how to use the system.

Fig. 4 shows the prototype of the interface for the frequently asked questions. This contains questions that are commonly asked by people having problems regarding legal separation and child custody

Fig. 5 shows the prototype of the interface where the user can have his conversation with ATTORNEY 209.

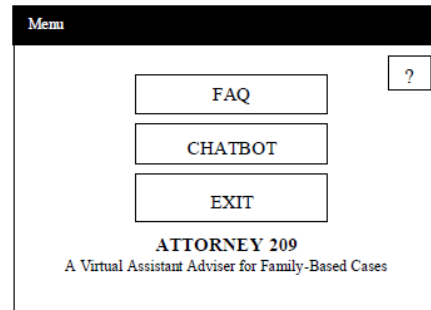


Figure 2. Main menu

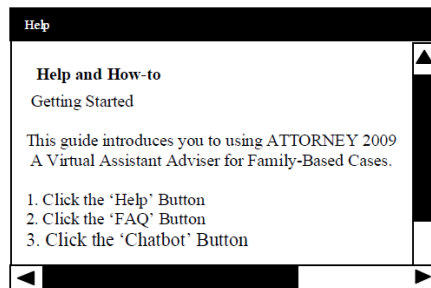


Figure 3. Help window

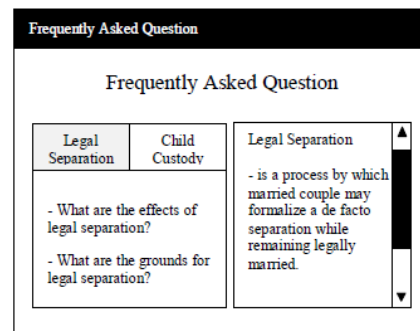


Figure 4. Frequently asked question window

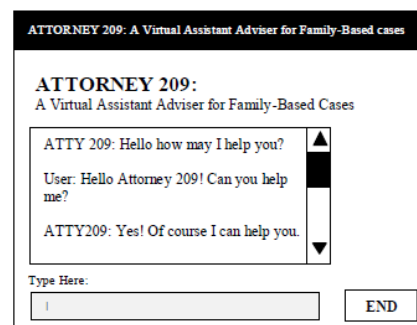


Figure 5. Conversation window

C. Research Design

Ref. [9] A descriptive method was used in the study wherein the data and the characteristic of the population are being studied. The purpose of the our research is to explore if there is a significant difference between the evaluation of the two groups of respondents coming from the College of Law, PUP and Public Attorney’s Office, Manila District.

TABLE I. TOTAL NUMBER OF FAMILY COURT LAWYERS TAKEN FROM THE TWO GROUPS OF RESPONDENTS.

Respondents	Total Size	Sample Size
Lawyers from Public Attorney’s Office	7	5
Lawyers from College of Law, PUP	7	5

The first group consists of the lawyers from Public Attorney’s Office and the second group consists of the lawyers from College of Law, PUP. Both of them have a total population of 7. Thus, we got 5 respondents (70% of the total population) from both categories who answered the questionnaire.

III. RESULTS AND DISCUSSION

After conducting a survey, the researchers use the formula for average weighted mean (1) to give importance to each item under consideration. The Likert-Scale was used in the study in order to present interpretation for the computed data. Since, the researchers would like to know the significant difference between the two groups; they used dependent t-test (2). Dependent t-test is applicable for small sample size ( $n < 30$ ). It is a test that assumes that the two groups being compared are related to each other, somehow as siblings.

TABLE II. SUMMARY OF THE COMPARISON ON THE ASSESSMENT BETWEEN COLLEGE OF LAW AND PUBLIC ATTORNEY’S OFFICE

Variables Tested	Family Lawyers from College of Law (X1)	Family Lawyers for Public Attorney’s Office (X2)	Computed T-value	Decision
Accuracy	3.96	4.52	2.59	Rejected $H_0$
Usability	4.24	4.6	2.08	Accepted $H_0$
User-friendliness	4.56	4.9	1.60	Accepted $H_0$

Table II illustrates the summary of comparison on the assessment of the Family Court Lawyers from Public Attorney’s Office and College of Law on ATTORNEY 209: A Virtual Assistant Adviser for Family-Based Cases.

Using dependent t-test, the result shows that the computed t-value for accuracy is 2.59. This is greater than the critical value which is 2.262 with 0.05 level of significance for two-tailed test and 9 as degree of freedom therefore rejecting the hypothesis in terms of Accuracy. While the computed t-value for usability is 2.08 and for user-friendliness is 1.60. These are all less than the critical value which is 2.262. It shows no significant difference in terms of Usability and User-friendliness therefore accepting the hypothesis.

IV. CONCLUSION

Based from the data gathered in implementing the study entitled “ATTORNEY 209: A Virtual Assistant Adviser for Family Based Cases”, the researchers conclude that:

- 1) The evaluation of the system based on the responses of the 5 family court lawyers from PAO, Manila District in terms of its accuracy, usability and user-friendliness are all “STRONGLY AGREE” with an equivalent mean score of 4.52, 4.6, and 4.9 respectively.
- 2) The evaluation of the system based on the responses of the 5 family court lawyers from the College of Law, PUP in terms of its accuracy and usability are “AGREE” while to the user-friendliness are “STRONGLY AGREE” with an equivalent score of 3.96, 4.24, and 4.56 respectively.
- 3) Based on the gathered and computed data, the researchers proved that there is a significant difference between the assessment of family court lawyers from PAO and College of Law, PUP in terms of accuracy. On the other hand, it shows that there is no significant difference in terms of usability and user-friendliness. The data shows that the two sets of family court lawyers had same perception regarding the usability and user-friendliness of the system, in contrast with that they had different perception on the accuracy of the system.

V. RECOMMENDATIONS AND FUTURE WORKS

For future works, the researchers would like to widen the scope of the study by means of adding up advice regarding annulment cases in addition to legal separation and child custody cases. Also add additional data into the database that would be useful for additional cases. Using of more algorithms would enhance the accuracy rate in order to be more efficient in providing an advice. The researchers would also like to consider making it to a web-based system so it would be convenient for the user to use and to access from any location.

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