



DEPARTMENT of COMPUTING

College of Business & Technology

EAST TENNESSEE STATE UNIVERSITY

CSCI 5260 – ARTIFICIAL INTELLIGENCE

PROJECT 3 – GUESS WHO?

GAME DESCRIPTION

BACKGROUND

Guess Who? is a logic-based game distributed by Milton Bradley, and now, Hasbro. Your opponent chooses a character with a set of characteristics. You have perfect information about all characters and all of their characteristics, as follows, and as specified in file characters.csv:

NAME	GENDER	HAIR COLOR	BALD	HAT	EYES	MUSTACHE	BEARD	GLASSES	EARRINGS
ALEX	Male	Black	FALSE	FALSE	Brown	TRUE	FALSE	FALSE	FALSE
ALFRED	Male	Red	FALSE	FALSE	Blue	TRUE	FALSE	FALSE	FALSE
ANITA	Female	White	FALSE	FALSE	Blue	FALSE	FALSE	FALSE	FALSE
ANNE	Female	Black	FALSE	FALSE	Brown	FALSE	FALSE	FALSE	TRUE
BERNARD	Male	Brown	FALSE	TRUE	Brown	FALSE	FALSE	FALSE	FALSE
BILL	Male	Red	TRUE	FALSE	Brown	FALSE	TRUE	FALSE	FALSE
CHARLES	Male	Blonde	FALSE	FALSE	Brown	TRUE	FALSE	FALSE	FALSE
CLAIRE	Female	Red	FALSE	TRUE	Brown	FALSE	FALSE	TRUE	FALSE
DAVID	Male	Blonde	FALSE	FALSE	Brown	FALSE	TRUE	FALSE	FALSE
ERIC	Male	Blonde	FALSE	TRUE	Brown	FALSE	FALSE	FALSE	FALSE
FRANS	Male	Red	FALSE	FALSE	Brown	FALSE	FALSE	FALSE	FALSE
GEORGE	Male	White	FALSE	TRUE	Brown	FALSE	FALSE	FALSE	FALSE
HERMAN	Male	Red	TRUE	FALSE	Brown	FALSE	FALSE	FALSE	FALSE
JOE	Male	Blonde	FALSE	FALSE	Brown	FALSE	FALSE	TRUE	FALSE
MARIA	Female	Brown	FALSE	TRUE	Brown	FALSE	FALSE	FALSE	TRUE
MAX	Male	Black	FALSE	FALSE	Brown	TRUE	FALSE	FALSE	FALSE
PAUL	Male	White	FALSE	FALSE	Brown	FALSE	FALSE	TRUE	FALSE
PETER	Male	White	FALSE	FALSE	Blue	FALSE	FALSE	FALSE	FALSE
PHILIP	Male	Black	FALSE	FALSE	Brown	FALSE	TRUE	FALSE	FALSE
RICHARD	Male	Brown	TRUE	FALSE	Brown	TRUE	TRUE	FALSE	FALSE
ROBERT	Male	Red	FALSE	FALSE	Blue	FALSE	FALSE	FALSE	FALSE
SAM	Male	White	TRUE	FALSE	Brown	FALSE	FALSE	TRUE	FALSE
SUSAN	Female	Blonde	FALSE	FALSE	Brown	FALSE	FALSE	FALSE	TRUE
TOM	Male	Black	TRUE	FALSE	Blue	FALSE	FALSE	TRUE	FALSE

PURPOSE

The ultimate purpose of this assignment is to write a program that interrogates your knowledge base through a series of Asks in order to deduce which player it has chosen (no peeking!).

PART 1 – PROPOSITIONAL LOGIC

DESCRIPTION

1. Given the information above, **fully develop** the game's propositional logic description in a Word Document. You must include the propositional logic descriptions of each character and characteristic.

CODING REQUIREMENTS

Download the **project3.zip** file from D2L. You will find two files contained in the archive:

- **project3_guess_who.py** – contains the driver program.
 - **KnowledgeBase.py** – contains a KnowledgeBase class that will represent what you know about the game and your opponent's character. Reads the characters from characters.csv into the characters list, as a dictionary object for each character.
 - **characters.csv** – contains the initial set of characteristics for each character.
 - (The other files will be used in Part 2).
2. Add code to the KnowledgeBase that randomly sets **one character** as the item your driver program will attempt to guess.
 3. Add one or more **ASK** methods to the KnowledgeBase, as needed, for you to interrogate it. These should return only True or False.
 4. Add an **ASK_VARS** method to the KnowledgeBase that interrogates the knowledge base and returns a list of the characters that match the query.
 5. Add at least one **TELL** method to the KnowledgeBase to inform the knowledge base about new information that you have found.
 6. Write a **driver program** (in project3_guess_who.py) that:
 - a. Uses the ASK, ASK_VARS, and TELL methods to interrogate the knowledge base.
 - b. The program must choose the questions to ask and it must provide the information gained back to the knowledge base.
 - c. The program must successfully solve the puzzle for each run. Allow the user to run the program again or exit.

PART 2 – PROPOSITIONAL LOGIC WITH RELATIONSHIPS

A FAMILY MATTER

As it turns out, all 24 of the Guess Who? characters are related. Relationships include:

Spouse (assume if two people are the parents of the same children, they are married), Sibling, Sister, Brother, Niece, Nephew, Cousin, Parent, Mother, Father, Grandparent, Grandfather, Grandmother, Great-Grandparent, Great-Grandmother, Great-Grandfather

I have provided a list of all parent/child relationships in file **relationships.json**.

PROPOSITIONAL LOGIC

7. In a separate section of your Project 3 Word Document, define the relationships noted above using propositional logic.

CODING REQUIREMENTS

From **project3.zip**, you will find the following two files:

- **project3_family.py** – Defines the Relationships class that reads the parent relationships from the json file.
- **relationships.json** – Defines all Parent relationships in the data.
- Note: You will need to import and use the KnowledgeBase from project3_guess_who.py to answer some of these questions.

8. Using your propositional logic definitions from question 7, implement one method for each relationship noted that returns True if x is the {relationship} of y. So, **parent("Anita","Paul")** would return **True** based on relationships.json, but **parent("Anita","George")** returns **False**.
9. Using this code, create an output CSV file that lists all relationship pairs contained in the family tree. This file should be in the following format:

Relationship_Name, Person_X, Person_Y

10. Write a **driver program** that allows me to interact with your Knowledge Base. Allow me to manually ask questions about the relationships above.

SUBMISSION AND DUE DATE

INTERIM SUBMISSION

An interim submission is required for this assignment to the **Project 3 Interim** dropbox. You should briefly detail the progress you've made and note any problems or questions you have. Submit a screenshot of one function that you have completed.

Failure to submit the interim submission ON TIME will result in the loss of 10% from the final Project 3 grade. Until you have feedback on this dropbox, you will not be allowed to submit the final solution. This is to encourage you to work on this early!

Project 3 interim submission is due to the D2L dropbox at or before Friday, March 12, 2020 at 11:59 PM

FINAL SUBMISSION

Submit all code and documentation, zipped into an archive: **Surname_Project3.zip**. The folder should be self-contained in a way that allows the code to run. You can assume that I have all necessary libraries installed.

Your archive should contain the following files:

1. project3_guess_who.py
2. project3_family.py
3. KnowledgeBase.py
4. Relationships.py
5. relationships.json
6. all_relationships.csv – The relationships learned in question 9.
7. A Word Document containing your propositional logic definitions and any explanations or assumptions.

Project 3 is due to the D2L dropbox at or before Monday, March 22, 2020 at 11:59 PM

The rubric appears on the following page.

RUBRIC

A letter grade will be assigned to each of the following, and will translate to a numeric grade based on the scale in the syllabus, and averaged into an overall percentage. As a reminder, anything below a C translates to an F by University Graduate School policy. It is provided here to appropriately reflect each level.

For source code, please add comments so I can understand what is going on. Believe it or not, some student code is difficult to read. :D

	A		B		C		D		F		Zero	
	A	A-	B+	B	B-	C+	C	C-	D+	D	F	0
Propositional Logic												
Q1 – Logic Description												
Q2 – Random Character												
Q3 – ASK												
Q4 – ASK_VARS												
Q5 – TELL												
Q6 – Driver												
Propositional Logic with Relationships												
Q7 – Relationships												
Q8 – Relationship Implementations												
Q9 – Relationship CSV												
Q10 – Driver Program												