## I. Use Case Description

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>Culture Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Case Identifier</td>
<td>n/a</td>
</tr>
<tr>
<td>Source</td>
<td>Rensselaer Polytechnic Institute Computer Science Department</td>
</tr>
<tr>
<td>Point of Contact</td>
<td>Beverly Sihsobhon (<a href="mailto:sihsob@rpi.edu">sihsob@rpi.edu</a>) Cameron Mine (<a href="mailto:minec@rpi.edu">minec@rpi.edu</a>) Chandler Dunn (<a href="mailto:dunnc@rpi.edu">dunnc@rpi.edu</a>) Amartya Chakraborty (<a href="mailto:chakra2@rpi.edu">chakra2@rpi.edu</a>)</td>
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<tr>
<td>Revision Date</td>
<td>3/5/2017</td>
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</table>

## II. Use Case Summary

### Goal
A user, who is familiar with a particular subset of television shows, finds a topic/political area covered in the show that they have questions about. The user then opens the Culture Shock chrome extension where they can find a response to their question (provided it is in the scope) from the perspectives of legislation and social networking. Each of the perspectives utilize their respective datasets to provide a holistic answer to the question that was presented.

### Requirements
**Legislation:**
The platform must retrieve reliable data. Data must be classified and searchable by general terms, so bills on health care, for example, should be classified as such even if the bill doesn’t contain the phrase “health care”.

**Social Networking:**
The relevant data must be available and accessible on social media to give sufficient results to the user about the topic.

### Scope
The scope of this use case is that the questions will be related to only television shows focused primarily on the themes present in the show. (The user will be made aware of the themes we support due to the fact we only accept questions in the following structured format: [Five Ws and Is] + [Character] + [Theme] )

Topics that are out of scope are defined by the themes not covered or mentioned in the program such as space travel and questions that have relevance to the show.

### Stakeholders
Development team: The stakeholders for this use case are the four developers, Beverly Sihsobhon, Cameron Mine, Chandler Dunn, and Amartya Chakraborty. The stakeholders also include Professor McGuiness and Professor Kendall as they are both our
mentors for this use case.

TV Program:
black community; television enthusiasts; Atlanta fans

Legislation:
Voters, legislators, educators, political or cultural researchers

Social Networking:
Social media users

### Description

The idea of how Culture Shock works is that the user will open the chrome extension. The extension will open as a small window that is part of the current tab. The user is then prompted to enter a structured question into that window. These questions are meant to relate characters in the show to specific themes that we have decided are central to the show. The extension will then use its ontology to search for a response to the question and provide samples of legislation and social media from real life to provide some context.

The ontology will be used to support inference of the additional information drawn from the show and theme provided to develop a better curated search to use with legislation and social media searches. Essentially the goal is develop a search that isn’t just a straight look up based on the query. If it can gather an appropriate amount of information, it will then look for information related to legislation which is focused on this topic. The ontology will go through the APIs provided by the Sunlight Foundation and Propublica in order to gather information about any relevant legislation on the topic and then provides it back to the user. Lastly, the ontology will look up terminology as needed through the use of Facebook and Twitter. The information as returned to the user will be social media results first which allows the user to either view the post directly or click on a link which takes them to the post. For relevant legislation, a list of legislation will be displayed to the user.

### Actors / Interfaces

**TV Show:**
Primary: data pulled about the show from sources like IMDB and Wikipedia

**Legislation:**
Primary: Sites from which data is pulled from/United States Congress
Pre-conditions: The use case assumes that the tv program has a wide enough range to answer the questions. Additionally, it assumes that there is a universal agreement to answer to the questions that can be proven by the data. Lastly, the programmer needs access to the script of the show, congressional bills available, and the data from social media trends.

Post-conditions: Upon filling out the structured query in a drop down in his or her question to the extension, the user will receive appropriate responses to the question.

Triggers: The trigger for this use case is whenever the user chooses to ask a question, which is physically achieved by clicking the extension’s icon and typing the question into the pop-up box.

III. Usage Scenarios

Usage Scenario A:

Sean makes heavy use of features such as Amazon’s X-ray and Google Play’s Info Cards while he watches tv. While he deeply enjoys seeing a cinematic masterpiece unfold before his eyes there is something about knowing more about the actors, related films and even the songs playing in the show that excites him. Yet unfortunately, Sean feels that while these info cards enable him to have a more trivial understanding of the programming they don’t provide him with an opportunity to do more or change the world. That remained the case until he downloaded the chrome extension Culture Shock. With Culture Shock, Sean can query the ontology at will to provide insight into things he is curious about such as mental illness. Sean spends the time reading the legislation that the ontology provided and now has a better picture on how messed up the system really is. Once Sean finishes reading the legislation he feels a need to stand up and make a difference for the members of this community. With the Facebook and Twitter posts that were returned Sean finds an organization that is fighting for equal rights that he can follow for an up to date information about how to fight for the cause. Not only has Sean learned more about
what it means to live with mental illness and how our congressional body addresses the issue but he walks away knowing he has joined a digital community that is willing to fight to the rights of all.

Usage Scenario B:

Chance sits at home in shock after having just finished the second episode of Atlanta. Although Chance pulled up the short synopsis (ontology term) of the episode before and learned “Issues like police brutality, mental illness, and transphobia are addressed as Earn awaits bail after the boys get arrested for their shooting incident” he wasn’t prepared the gravity of the episode. After watching he wondered if a character he saw as a victim of police brutality. Although he had heard the term multiple times before he wasn’t sure what constituted police brutality (ontology term & theme). So he opened Culture Shock and using drop down menus entered “Does [Insert Name] suffer Police Brutality?” The application that uses the ontology begins the process of establishing an answer by first looking for the definition of Police Brutality. The ontology encodes that determine that Police Brutality is the exertion of unnecessary force by a person in a law-enforcement occupation on a private citizen (ontology term) from the term list. From there the ontology must identify who the person is selected is and their relation to the show. Given that Chance has provided a character in the show the ontology must begin accessing whether or not they were a victim of Police Brutality or not. In addition to the definition the ontology knows there are subclasses of Police Brutality which act as specification to be met in order to determine if force was some form of excessive. The ontology does so by going through each of the subclasses checking to see if they apply to any events (ontology term & class) that the character was when a person in the role as a police officer also occurred. As it turns out, [Insert Name] was in fact a victim of three types of Police Brutality recognized by the United States court of law according to the Sam Bernstein Law Firm who we credited the definitions with. To enlighten Chance more about the topic of Police Brutality, he is presented with legislation that was selected based on a keyword expansion on theme. The same goes for social media.

Usage Scenario C:

“Wow this Zan guy is absolutely terrible....I wonder if people really actually act that way” Sarah ponders as she turns off the show. She then heads over Culture Shock hits the button then types in the structured question “what's a social media troll?” The ontology beings by identifying a the theme of the question which given the structured question format is at the end. Upon querying the knowledge graph which hold the terminology the ontology determines that a social media troll is a person on the Internet who purposefully makes jokes in a mean manner, specifically in on Social Media (ontology term). In order to find legislation that is related to the given question we need the ontology to make the inference that Social Media, defined as a method of digital communication and interaction between persons, is a form of freedom of speech (ontology term). The ontology should make this reference from the fact that both Social Media and freedom of speech are dependent on communication. Once this inference is made then we can return legislation that relates to freedom of speech, social media, troll should anything come up. We would then use the keyword troll as our means of searching Facebook and Twitter for material to give to Sarah.
Usage Scenario D:

Abigail is part of the Wenger Mennonites Amish community who as a twenty year old is enjoying her period of Rumspringa. As a result of Abigail’s religious upbringing she is confused as to why the character Van lost her job. Using a computer with Culture Shock on it, Abigail enters the structured query Why did Van lose her job? The application that uses the Ontology begins make determining who Van is in the show. Next the Ontology must determine in what episode her employment status changes which will be based on the hand curated event class that was created from the short synopsis. Now that both character, episode, and theme {weed} have been identified the ontology can move forward to the perspectives it needs to cover. For both perspectives the ontology will run an expanded keyword search in order to find materials about weed (and it’s various aliases determined by synonyms and keyword expansion). Abigail not only has the answer to her question as to why Van was fired, but also has enough material from a legal and social media standpoint to make an informed decision about the significance of drug use. While the ontology itself has offered no opinions on the matter, it has ensured that Abigail will make a educated decision by giving her the tools she needs to be successful in understanding the world.

Usage Scenario E:

“So...is Earn impoverished?” Rachel isn’t really sure about what poverty in America looks like so she goes to Culture Shock types in her structured “Is Earn in poverty?” The ontology then determines who “Earn” is in the show and what the word poverty (ontology term & theme) means. The ontology determines the definition of poverty by using the term list generated by the Culture Shock developers and finds that there are subclasses which act as specifications for poverty. Within those subclasses there is relative poverty and absolute poverty which the ontology infers are types of poverty Earn’s situation can be compared against. Absolute poverty refers to the inability to get one’s basic human needs meet while relative poverty is being impoverished relative to one’s society: Atlanta, GA. The ontology must then make inferences about Earn’s situation by looking at the properties assigned to the character class. One of the properties of the class will be hasResidence which for Earn will be a no. As the ontology moves through the property requirements for the types of poverty to ontology should be able to determine that although Earn is not in absolute poverty he is in relative poverty to Atlanta, GA. Thus Rachel’s question is answered and she can spend the time reading the legal and social media material provided on the theme of poverty.
### IV. Basic Flow of Events

<table>
<thead>
<tr>
<th>Step</th>
<th>Actor (Person)</th>
<th>Actor (System)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening the extension</td>
<td>User</td>
<td>Interface</td>
<td>User clicks on an icon in their chrome menu bar</td>
</tr>
<tr>
<td>Display UI</td>
<td>User</td>
<td>Extension</td>
<td>Extension displays UI window to user and prompts a question</td>
</tr>
<tr>
<td>Entering question</td>
<td>User</td>
<td>Input bar in the interface</td>
<td>User enters question and then waits for results back from the extension.</td>
</tr>
<tr>
<td>Process Question</td>
<td>User</td>
<td>Extension</td>
<td>Extension processes the user’s question using the ontology and obtains specific keywords to utilize for searching</td>
</tr>
<tr>
<td>Retrieve results from legislation source</td>
<td>User</td>
<td>ProPublica and Sunlight Foundation</td>
<td>Extension uses legislation APIs to search for relevant bills and other cases matching the extracted keywords.</td>
</tr>
<tr>
<td>Search results on Twitter</td>
<td>User</td>
<td>Twitter API</td>
<td>Extension utilizes Twitter API to search for relevant, recent, popular tweets matching the extracted keywords.</td>
</tr>
<tr>
<td>Search results on Facebook</td>
<td>User</td>
<td>Facebook Graph API</td>
<td>Extension utilizes Facebook’s Graph API to search for relevant, recent, popular public posts on Facebook matching the extracted keywords.</td>
</tr>
<tr>
<td>Display Results</td>
<td>User</td>
<td>Extension</td>
<td>Extension populates HTML page in a new tab with results from legislation and social media, providing the user with a variety of relevant results to their query</td>
</tr>
</tbody>
</table>

### V. Alternate Flow of Events

<table>
<thead>
<tr>
<th>Step</th>
<th>Actor (Person)</th>
<th>Actor (System)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to update data</td>
<td>Person</td>
<td>Interface</td>
<td>If due to some network error or some other reason that we couldn’t do the search, there should be some kind of message</td>
</tr>
<tr>
<td>Search</td>
<td>Person</td>
<td>Interface</td>
<td>Returns the following message: Seems like we are</td>
</tr>
<tr>
<td>Search returns nothing on legislation</td>
<td>Person</td>
<td>Interface</td>
<td>If the search is unable to find anything related to legislation, a concise message should tell the user that no related legislative information could be found</td>
</tr>
<tr>
<td>Search returns nothing on social media</td>
<td>Person</td>
<td>Interface</td>
<td>If the search is unable to find anything related from social media sources, then a concise message should tell the user that no relevant pieces of social media could be found</td>
</tr>
</tbody>
</table>

VI. Use Case and Activity Diagram
A) Primary Activity Diagram
Please look on next page. Something happened when trying to upload the image to this document. The complete primary activity diagram can be found there.
B) Sub Diagram 1 - Legislation Results

C) Sub Diagram 2 - Twitter Results

D) Sub Diagram 3 - Facebook Results
E) Sub Diagram 4 - Display Results
VII. Competency Questions

NOTE: We have set up our competency questions in a tiered format. Some questions are necessary questions for the ontology to answer but are a subset of questions that relate the larger more important questions that we expect users to ask the system. We have bolded the important competency questions.

Preface: While we have made changes in the ontology and solidified in our minds how the ontology achieves the inferences talked about below, we only provide a couple of in depth step by step walkthroughs of how the ontology uses what it knows and applies inferences. Creating step by step walkthroughs for each one would become fairly repetitive in the sense that it would become less about a novel sort of inference and more just specific to the data being used for the question. The changes made are less of inherent structural changes but more like an expanded addition to what was already there.

Preface 2: In response to why we do not have more changes to the competency questions from last week. As described in our presentation last week, we have reached a roadblock and require confirmation and approval from the professors before we feel comfortable moving forward. We cannot achieve the level of inferencing that the professors are looking for without using NLP techniques or essentially hard coding properties to basically translate natural language sentences of the events so that the reasoners can reason about them. We were told two weeks ago that this
was not satisfactory, but last week we were also told that we should not be spending the time to implement NLP algorithms. The way we have described how the competency questions will be answered stands. We do not have exact specific properties to reference in all of them, but at least two have very complete (we think they are complete) step-by-step walkthrough of how the reasoners are expected to behave. If it is okay to use hand curated properties, then we can move forward and add more properties in and describe other competency questions. If not, we will need a lot of help because we have had very long discussions and cannot find another alternative. We have sent emails and even presented on this fact but have yet to come to any further conclusions.

1. **Is Darius black?**
   a. While this question at first seems like a basic yes or no question, the importance of the ontology will be with how it uses the definitions and relations to draw inferences to important topics that can be used to search for legislation and social media. If it’s okay, I will break this question up into multiple questions that will count towards our 10. Question 1: Who is Darius?
      i. The ontology will first need to identify that from a tv show there are characters and that there is a character named Darius. A property of the term Darius would include that he has Nigerian routes (so he is Nigerian American). This part relates to the other part of this general question. However, the most important fact that the ontology finds is that this character has direct ancestors from Nigeria. Ideally, the ontology will include a term for Darius and include a property about him that is “racial/ethnic background”. Here the property of “racial/ethnic background” will contain the instance of “Nigeria” which could be another instance of the class “country” for example.
   b. Question 2: What is the requirement to be black?
      i. Essentially within the ontology, the concept of “black” will be defined as a term that follows from a general theme of race. While we know that race is a sensitive and difficult topic to define, we use it here as a way to help categorize and incorporate the term “black” into the scope of the ontology. The term “black” is important to the show and thus important to the ontology. Another place to put it might be as a subterm of types of actors (every tv show has actors) or types of characters, but neither of these places seem ideal in placement for this term within the structure. The basic definition is a person having origins in any of the Black racial groups of Africa that also include respondents who reported entries such as African American; Sub Saharan African entries, such as Kenyan and Nigerian; and Afro-Caribbean entries such as Haitian and Jamaican. As mentioned above, Nigeria is a term where it is defined as being a country in Africa so yes Darius is black. Note that the definition above is subject to change and the important part is that since he has routes from Nigeria he is a black person.
   c. Inferencing
      i. Now even though the ontology has technically answered the question, the
other aspect of our project is to provide relevant legislation and social media posts. While it’s possible that we could just do a general search on “black” or “race”, the ontology can help identify terms that are more relevant to these two outlets. The goal of this question is not to determine if Darius is natively born in America or not. The usefulness of the ontology here is that it can at least recognize that Nigeria and the United States are not the same term (a form of unification or identity resolution however that is implemented within the language used). The term “United States of America” would be an instance of “country” as described earlier. The show takes place in Atlanta, Georgia, United States of America (another property and is an instance of “place”). As Nigeria and the US are not the same country, there can be at least some kind of inference that to get from Nigeria to the US or vice versa movement must be needed to transfer oneself from one physical location to another. While this would not directly refer to Darius being an immigrant, the idea of “immigration” is at least a plausible one for his ancestors. We are not aiming to identify the type or make any conclusive statement about Darius’ ancestor’s method of immigration, but we will use the concept as a searching point in legislation. Searching for “black” or “black people” would not yield useful results (too broad or uninformative results), but searching for “immigration” will yield a more specific search with more informative results.

d. Searching
i. Legislation
1. Primarily now that the ontology has identified “immigration” to be the main search, it can now search through Congress.gov from APIs using the term “immigration”. To narrow down that search, we can also have it expanded to “Nigeria” or just “Africa”. We pick the top ten pieces of legislation (that may or may not be curated based on time and ability). We would also be able to refine searches to passed bills or to exclude resolutions (but that’s up to later decisions).

ii. Social media
1. We do not fully agree on this aspect yet, but here is my personal take: for social media, due to the vastness of Facebook and Twitter, it would be important to start the search off with “immigration” and “Nigeria” or “immigration” and “Africa” to narrow down results. Also results would be limited to the past year to keep posts relevant. For Twitter, the tweets we pick will be based on the number of favorites and retweets, and for Facebook, the posts we pick will be based on the number of likes and shares. We will not be parsing through the posts to decide whether or not to use them. We are going purely off of the numbers of likes, favorites, retweets, shares, and reactions respectively to decide whether or not to return the post as a result. Some posts may end
up being offensive I suppose. I do know how Twitter or Facebook has implemented their searching algorithm but I assume some aspect of it is based off of simple string matching. Also we will be interacting with these sites through APIs created by Twitter and Facebook.

2. **Did Alfred use drugs?**
   a. Similar to other questions, the ontology will need to identify who Alfred is as well as episode information about him. We will have summary information about each episode that relates the important event to the characters involved. The background information will be a difficult component to fill in as we do not have a comprehensive data set for these character and event information. The ontology will need to identify who the characters are and then look through the episode terms to identify that information. There are rumors in the show about Alfred, which can be mapped to character properties, that state he has either used drugs or is a drug dealer. While the overall question seems like a trivial yes or no answer, it is important to note that the inferencing will draw out the underlying question or assumptions made by this provided question. From “drugs” the ontology can identify that there are sub terms under drugs that describe popular drugs used. The ontology could then assume that if he used drugs, it would be one of these drugs statistically that he had used.
   b. **Inferencing**
      i. The ontology would infer that because Alfred used drugs, he was in *possession* of drugs. The ontology would look through the themes and sub categories to see if there’s anything important in relation to themes. It would look through crime and see that being in possession of drugs is a form of inchoate crime. From this the ontology now knows that not only is being in possession of drugs a crime but also that it makes Alfred a criminal. From here it orient the searches to be more relevant to his possession of drugs.
   c. **Searching**
      i. **Legislation**
         1. Now that the ontology has identified possession of drugs as a crime, it can use this information as search terms for legislation. The search terms would be “crime” and within it would be “possession of drugs”. If the results turn out to be too limited, then we can also expand the search to just “crime” and “drugs” or specific a kind of drug. We are not really trying to be “fair” or analyze the differences between these types of crimes in the ontology. Rather the requirements that must be met for each one of these types of crimes will be defined differently so that there is a difference between using/possessing drugs and selling/possessing drugs. The important part will be the difference between using the drug and selling the drug not the possession portion. The searching could follow the similar filtering methods mentioned in the other questions.
ii. **Social Media**

1. Social media would replicate a similar search but instead of searching “crime”, it would just search “possession of drugs” and it could search specific kinds of drugs. The results would be limited to within the past year.

3. **Is Alfred a drug dealer?**
   a. While along a similar vein of the previous question, the inference that the ontology takes would be different. While still identifying all of the information listed above. The ontology would see that within the background information property of the character, there are rumors about him being a drug dealer. This part will have to be hand curated as this is a new show, and there is no ontology or database that organizes this information. Assuming that he is a drug dealer, the ontology will identify that a drug dealer involves drugs. Search through the themes of the show, it would see that based on the definition of “drug dealer”, it would classify that as a type of statutory crime. Within the ontology (if you look at our curated terms list and concept map), there is a class “theme”, and then another class “crime”, and then from within “crime” there are subclasses of specific types of crimes that we wish to define for the ontology. We will not go into crimes that are not mentioned or related to this show.
   
   b. **Inferences**
      
      i. The ontology could then be used to infer that a drug dealer involves the selling of drugs which is why it satisfied the classification for being a type of statutory crime. It could infer that being a drug dealer involves possession of drugs but is different from possession of drugs. It can then use these inferences to help refine the searches.
   
   c. **Search**
      
      i. **Legislation**
         
         1. Terms would be “drug dealing” or “drug dealer” and “selling drugs” and possibly “crime”. As with the other questions, it would follow similar filtering to help identify the top 10.

      ii. **Social media**
         
         1. Terms would be “drug dealing” or “drug dealer” and possibly “crime”. As with the other questions, it would follow similar filtering to help identify the top 10.

4. **Why did Van lose her job?**
   a. Like the other questions, the ontology will first need to identify who Van is, what her occupation is, and episode information that mentions an event where Van loses her job. This part will have to be hand curated as this is a new show, and there is no ontology or database that organizes this information. Within that same episode, the ontology will identify that during that same episode she had smoked weed. The ontology would then draw the conclusion that it was because she smoked weed.
   
   b. **Inferencing**
      
      i. In order to identify the more useful search terms for legislation and social media, the ontology would first see that weed is another name for
marijuana, and marijuana is a type of drug. From there it would then infer that she was in possession of drugs and follow similar inferencing to the question(s) above. However, instead of just assuming that the general idea is possession of drugs, the ontology could use the fact that it now knows she used and had drugs to help with the searching in relation to losing her job. This part will have to be hand curated as this is a new show, and there is no ontology or database that organizes this information. This is an important event that happens to Van (as losing a job generally is), so it will be a necessary property to be added either as its own property or as a part of a background information property. The ontology would infer that if someone has a job, then they have an employer.

c. Searching
   i. Legislation
      1. The search would now be refined to “marijuana”, “job”, “employer”. We assume that “marijuana” will be the main name for the term and “weed” would be an alternate name as property. It could be expanded or narrowed to “drugs”, “drug usage”, “possession of drugs”, etc. It would follow similar filtering as other questions to help identify the top ten pieces of legislation.

   ii. Social media
      1. For social media, we think that we could extract “lose her job” and change it to “losing their job” and “marijuana” (or “weed”) for the search. This is an example of a difficult search as we have to actually alter the word, so if it ends up being too hard, we can search for "lose", "job" and "marijuana" as separate terms instead of the phrase "losing their job". As described in the basic flow, we are going to have structured queries (users pick the keywords from a drop down so [QUESTION WORD] [CHARACTER] [THEME]) that will make it easier to parse. We will filter similarly as with the other results from social media. We will for now choose the top five tweets from Twitter (this pick is based off of the number of favorites and retweets the post has) and the top five posts from Facebook (this pick is based off of the number of likes/reactions and shares as well as picking posts from friends).

5. Is Ernest in poverty?
   a. There are several components that are needed within the ontology. If it’s okay, I am going to break this question down into two sub-questions (but is counted in our 10 total questions). Question 1: Who is Ernest?
      i. First it will have to know who Ernest is. The ontology will see that part of every tv show (tv show is the top level of the ontology (so the root)) there are characters and Ernest is a character (and a main character). Keep in mind that the important is related to the second question (which follows below) where based on the provided definitions of poverty, Ernest based on details about him will match him with a specific kind of poverty.

   b. Question 2: What is poverty?
i. Then it will look for poverty. There are two methods of setting this up. Either every tv show has episodes and every episode has themes or every tv show has themes (that isn’t to say there cannot be relations connecting tv show to theme while also connecting episodes to theme). There will be a general theme of poverty, but from poverty there will be subcategories of types of poverty. Before the specific categories within poverty, there are two types of poverty: relative poverty and absolute poverty. These are two necessary terms to help identify and answer what type of poverty Ernest is in. In this case, based on the defined conditions of relative poverty and absolute poverty, the ontology will be used to identify that he is in relative poverty. He lacks permanent residence, but he still has access to basic fundamental needs such as shelter, clean food and water, and education. From relative poverty and absolute poverty, we would define the subtypes of poverty as mentioned below. There should also be other terms or something property within the term poverty that notes different parts of speech or forms (like impoverished).

c. Here’s where the inferencing comes in.
i. The ontology will either contain a property of the term, Ernest, that he lives in a storage unit or it will contain an complete episode summary where it will look through the ten available episodes and see that there is a focus in episode 10 on the fact that Ernest lives in a storage facility space. A subterm of poverty, which we might call poverty_no_permanent_residence, will be defined as someone is considered homeless or in poverty if they do not have a permanent residence or if they live in tenement housing sponsored by the government (will solidify this definition in the future). The ontology will then identify that Ernest falls under this category and from here develop a more fine tuned search for the question. Basically the condition to fall under this kind of poverty is that an individual has to have no form of permanent residence or they live in government sponsored housing. We assume that this can be mapped to an OWL or RDF formatted logical conditions to satisfy this term.

d. Searching
i. Legislation

1. Instead of just doing a general search about poverty, the ontology can now leverage this new information about homelessness or lacking permanent residences to help search for related legislation and social media posts. When searching through the APIs that connect to Congress.gov, the terms will be within the search “poverty”, search “homelessness” and “no permanent residence”. The API’s will be using a GET request that will most likely take in the search words. If the search returns too few results (so fewer than 10 for a basic case), then it could then remove “poverty” from the search, and just search “homelessness” and “no permanent residence” separately to make sure that the previous search wasn’t
limited by the term “poverty”. The top 10 results, which could then be curated depending on how much time we have to sort through the results, will then be returned to the user.

ii. Social Media

1. From these pieces of legislation, we could also, but this optional for now, pull geo-location information based on the legislator that sponsored the bill to help narrow down specific places from which we grab social media posts. With social media, we would do a similar search with the terms “poverty”, “homelessness”, and “no permanent residence” along with a filter of looking at posts within the last year to keep the posts somewhat relevant. We will for now choose the top five tweets from Twitter (this pick is based off of the number of favorites and retweets the post has) and the top five posts from Facebook (this pick is based off of the number of likes/reactions and shares as well as picking posts from friends).

6. In episode 8, was Paper Boi accused of armed robbery or for the shooting at the club? / [Does][[Alfred Miles][None][commit a crime?]

   a. The ontology would be used to evaluate terms such as “armed”, “robbery”, “shooting” and “club”. In addition, the ontology would need to find out who Paper Boi is exactly and what situation he got himself into that involved the accusations. The inferences here are that the ontology can relate shooting to guns and thus it can look into legislation on guns. The important search for legislation will be focused on gun laws that can be specified down to “armed” “robbery”. The structured query provided will be more like this: “Why” “Paper Boi” “armed robbery”? The ontology will need at least infer from the base definition of “armed robbery” that it involved weapons that could most likely be guns. On social media, the same can be done in terms of trying to find relevant conversations on gun control, armed robberies and even experiences at the club and also look for any posts about any shootings or robberies which occurred at some club. Both armed robbery and shootings can be seen as a personal crime since they both cause physical and mental harm to the victim.

7. In episode 10, when the Uber driver was shot by the police, was that a case of police brutality?

   a. The ontology here would be used to evaluate the terms such as “police brutality” and “shot”. Although for “shot”, it might not be a term but instead be related to a subclass of “police brutality”. As for inferences that can be made, the term “shot” means that there may have been some weapon utilized usually related to a gun. In addition, the ontology would also need to identify some background information on the Uber driver since he was involved in dealing drugs. Thus, as he was involved in some criminal activity, whether or not police brutality occurred in this case is not as easy to define. From there, the ontology would evaluate the information it has extracted along with the criteria for police brutality and then determine whether or not this was an example of police brutality. The ontology can search for legislation related to gun control as well as legislation that focuses on police brutality. Moreover, the ontology would also be able to find recent posts
on social media that relate to police brutality as well as topics such as dealing drugs.

8. **Does Lee suffer from Police Brutality?**
User inserts the question above in the tool from the structured question drop down menu. We will skip over the technical details about how the interfacing with the ontology works. The ontology recognizes the terms in the structured query. The first word/phrase the ontology would look at first is the theme which in this case is “police brutality”. This theme was selected from a drop down menu that the system knows is related to theme class (this information is known to the ontology as well as something we tell it from the backend). The ontology identifies that police brutality is a term and can then pull out the definition we have provided. First it will see that there are subclasses from this term which tells us that there are specific types of police brutality. Now that we know the general theme, we will now look at the character provided to help fine-tune the type of police brutality (we assume that we can store the information we found from police brutality somewhere as we do other queries to the ontology). So the character also comes from a drop down list and is a term within the ontology. As we build the knowledge graph/database that stores the literal information about the terms, we will fill in character data about the characters available in this drop down. The ontology can then find this character as an instance of the term “character” and also retrieve the literal data about this character. Then we would need to do a word search through the “events” property of the character to see if there’s anything that matches “police brutality”. The ontology will also have properties associated to the specific character and to the types of police brutality. This character will have an event where they interacted with the police. This character will also have properties called “hasBeenBeaten” and “hasInjuries” where this person (name we do not remember at the moment) was beaten by the police and sustained injuries in this event. Similarly one of the subclasses of “police brutality” will also contain these two properties that must be satisfied for it to be considered this subclass. To clarify, the property “hasBeenBeaten” is a property of “police brutality” that gets inherited by the subclasses. Similarly, the “hasInjuries” would also be associated with “police brutality”. The subclass is “excessive force police brutality”. We defend that this is still an inference because the ontology reasons that because this person experience these things (properties) and in order to satisfy this type of police brutality you have to meet the requirement of having these properties, the ontology can then infer that this person experienced “excessive force police brutality”. This character also has a property of “hasJob”, and one of its values is “detainee” which symbolizes that they are/were in police custody. The “Event” class also contains the property of “hasPlace” and “hasCharacter”, so the ontology can identify location and those involved in the event. They also have a property “hasMentalIllness”. These three properties satisfy the requirement properties for the type of “violation rights of pre-trial detainees”. Keep in
mind that the definition of this type of police brutality includes other properties but they are not necessarily required to all be satisfied. The definition/property requirements being:

\[ \exists x (\text{Person}(x) \land \text{isInJail}(x) \land \text{hasMentalIllness}(x) \land \neg \text{isInMentalInstitution}(x)) \lor \exists x (\text{Person}(x) \land \text{isInJail}(x) \land \text{hasPhysicalDisability}(x) \land \neg \text{hasDisabilityAid}(x)) \lor \exists x (\text{Person}(x) \land \text{hasInjuries}(x) \land \neg \text{hasReceivedMedicalAttention}(x)) \lor \exists x (\text{Person}(x) \land (\text{hasPoorShelter}(x) \lor \text{hasNoFood}(x) \lor \text{hasPoorProtection}(x))). \]

We are also assuming here that the system uses an inclusive OR or probably uses existentials to represent this requirement (so not exclusive or disjoint OR). The fact that this person is in jail means that they are in police custody (which can be easily captured in a property if needed). If needed, we can also draw from the fact that because he has a mental illness, he should be detained in a mental institution and not a standard jail. Finally the other type of police brutality they experience is “malicious persecution”. The person would also include a property of “\text{hasExperiencedVerbalAbuse}” which is a required property to satisfy “malicious persecution”. Something important is that the verbal abuse is committed by the police where there is a character who’s job is “police”. With all of these properties, the ontology should be able to determine that this character experienced three types of police brutality: “malicious persecution”, “violation rights of pre-trial detainees”, and “excessive force police brutality”. To clarify, the ontology would then follow the inverse relationship from the “Character” class to the “Episode” class (characters are in episodes). From there, each “episode” has a “storyline” and a “storyline” has a “plot” and a “plot” has “subplot” and a “subplot” has “event”. The “event”s of a show are included as an “ordered list” (another mini ontology we defined). Each event is defined...TBD From here the ontology has done its inferencing and its job which we can then use for searching for legislation and social media. If necessary the ontology could continue evaluating properties/facts of this character to determine other relations about this character, but this is probably unnecessary for the scope of this question.

**Character**: Lee

**Lee**: hasBeaten(“yes”), hasInjuries(“yes”), hasMentalIllness(“yes”), hasJob(“detainee”), hasEvents(<list of events that would be too long to write out here but will be present in the knowledge graph>), hasExperiencedVerbalAbuse(“yes”)

**Theme**: Police Brutality

**Police Brutality**: Excessive Force, Malicious Prosecution, Violation Rights Of Pretrial Detainees, etc. - properties like hasBeaten(“true”/“false”) is part of this class but passed on to its subclasses

**Excessive Force**: requirement satisfiability is \[ \exists x (\text{Person}(x) \land (\text{hasBeaten}(x) \land \exists y (\text{beatenBy}(x,y) \land \text{isJobPolice}(y))) \land \text{hasInjuries}(x)) \] - in English: If there exists an x that is a person and they have been beaten by a y who’s job is a policeman (genderless) and x has injuries. Note we do not require that this y is a person, but the hasJob property is only associated with people.

**Malicious Prosecution**: requirement satisfiability is \[ \exists x \exists y ((\text{Person}(x) \land \text{hasExperiencedVerbalAbuse}(x)) \land \text{isJobPolice}(y) \land \text{isVeraballyAbusedBy}(y)) \]
There exists two things, an x and a y, where x is a person who has experienced verbal abuse and y has the job of being a policeman and x is verbally abused by this y; the inference here is that even though y doesn’t explicitly have to be a character or even a person, the ontology can infer this verbal abuse relationship as long as there is a property that labels the object as a “police”. 

\textbf{ViolationRightsOfPreTrialDetainees:} requirement satisfiability is
\[ \exists x (\text{Person}(x) \land \text{isInJail}(x) \land \text{hasMentalIllness}(x) \land \neg \text{isInMentalInstitution}(x)) \lor \exists x (\text{Person}(x) \land \text{isInJail}(x) \land \text{hasPhysicalDisability}(x) \land \neg \text{hasDisabilityAid}(x)) \lor \exists x (\text{Person}(x) \land \text{hasInjuries}(x) \land \neg \text{hasReceivedMedicalAttention}(x)) \lor \exists x (\text{Person}(x) \land (\text{hasPoorShelter}(x) \lor \text{hasNoFood}(x) \lor \text{hasPoorProtection}(x))) \]

- From these definitions of these subclasses of police brutality, we can see that there does exist a character, name that we forgot but will find, that satisfies the requirements for “excessive force”, “malicious prosecution”, and “violation of rights of pre-trial detainees”
  - inferences are made at the level of determining the definitions and at the level of determining if this character fits under these types of police brutality (as in they experienced it)
  - \textbf{Answer:} The ontology would return that Yes, Lee, experienced police brutality and that the types of police brutality he experienced are excessive force, malicious prosecution, and violation of rights of pre-trial detainees. We can then use these terms for searching for legislation/social media and we can also provide definitions of these terms potentially.

\textbf{9. Is Alfred Miles Zan Trolling}

So like the previous example, the question gets inputted into the system and thus the ontology. First the ontology looks up the theme which is “trolling”. The requirement properties for trolling (so to be a troll) are “hasAngryResponse” and “hasDeliberateIntentions”. We then look to the two characters listed in the question provided: Zan is the second person listed so based on our formula we are considering the second person to be the aggressor (the person in question of trolling). According to the structure of the social media part of the ontology, every post has a “handle” which is associated with a “user”. In the knowledge graph we know the character’s Alfred Miles and Zan’s handles which will enable to ontology to determine who wrote the post, who made comments associated to the post, and who was mentioned in the post.

So at this point, we have established that Zan made a post that Alfred both is at-mentioned in (using the @PaperBoi handle) and comments on this post. The property “hasAngryResponse” is established from data in the knowledge graph; this data is gathered from the plot summary of the Episode 4. An additional property of “post” is that a “post” has a “hasTopic” property. From the knowledge graph, the ontology knows that for this specific post, the value of this property is “Paper Boi”. By connecting the facts that Zan made this post, Paper Boi was tagged in the post, Paper Boi angrily responded to the post, and that the topic of this post was about Paper Boi, we believe it is an appropriate inference for the ontology to think that Zan trolled Paper Boi. As the definition of “trolling” states that to be trolling, someone has to “make a deliberately offensive or
provocative online post with the aim of upsetting someone or eliciting an angry response from them”.

10. What is Earn’s relationship with Vanessa?

The ontology in this case would be involved in finding out about who Earn is and who Vanessa are and what their relationship is. The ontology would have to comprehend the meaning of the term “relationship” and what it exactly means. The inferences here are that “relationship” can mean terms such as “civil union”, “partner”, and “marriage”. Thus, legislation involved here would be based on these topics. As for social media, the ontology would search Twitter and Facebook to find relevant posts on these topics.

VIII. Resources

Knowledge Bases, Repositories, or other Data Sources

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<th>Description</th>
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<th>Access Policies &amp; Usage</th>
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### Facebook Graph API

| Remote | Social media API | Can provide posts made by other individuals or pages related to the question asked. | https://developers.facebook.com/docs/graph-api |

### Twitter Streaming API

| Remote | Social media API | Can provide posts made by other individuals or pages related to the question asked. | https://dev.twitter.com/streaming/public |

### External Ontologies, Vocabularies, or other Model Services

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Other Resources, Service, or Triggers

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IX. References and Bibliography


