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CS 4396

4/10/2022

Python ChatBot Report

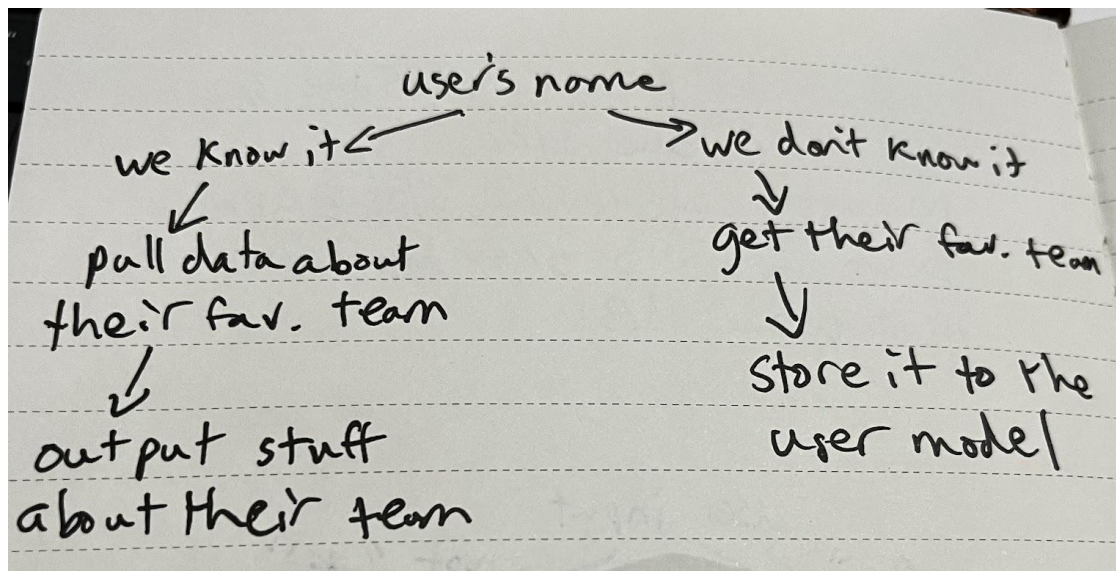
We created a chatbot named NFL Bot. Its goal is to talk to a user about the NFL and give them some info about the teams in the NFL. It knows the locations of all the teams and some fun facts about them.

Our chatbot uses the ChatterBot library in Python as a backup in case we did not account for a question in our dialog flow. The library allows us to easily train the bot with our own knowledge base. The chatterbot library uses Python version 3.8 and requires an installation of chatterbot and a chatterbot_corpus to create a basic conversational knowledge base. We can then use our pickled knowledge base to train our chatterbot with knowledge about the NFL Teams. We added a new feature in which the bot can remember the name of the user and their favorite NFL team. This helps the bot give relevant information about the user's favorite team when they log back into the bot. The ChatBot works by getting a response from a list based on its confidence level. The bot searches the corpus for the keywords in the user's input and then tries to get the best response that accurately replies to the user. Our knowledge base has extensive information on all the different NFL teams, which allows the bot to provide information to the user based on their favorite one.

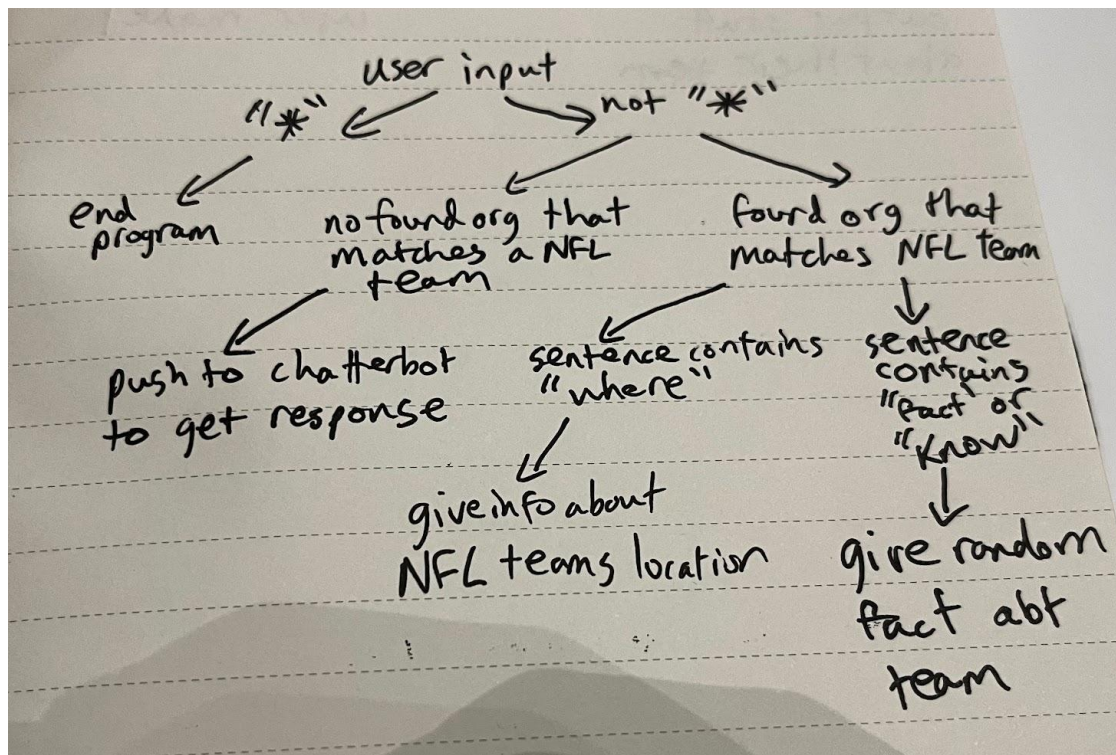
We added spaCy Named-entity recognition to the bot so that it can detect when a user is talking about a specific football team. NER allows the bot to know that there is a team mentioned in the input so that it can respond accordingly. The bot also uses some NLP techniques to search through the knowledge bases and generate a confidence score for the best responses. It uses attributes such as the similarity of the input to other training statements and the frequency of those similar words. Our bot uses Naive Bayesian Classification as a backup to find out what the user's input statement means and the best way to generate a response for it in case the question is not about NFL teams.

Dialog Tree Diagram:

This first diagram shows the dialog tree at the very beginning when we get the user's name.



This second diagram shows the looping dialog logic when the user inputs a string.



Sample Dialog:

Sample Conversation #1:

NFL Bot: Hi my name is NFL Bot! If at any time you want to stop, just enter *

NFL Bot: What is your name?

John

NFL Bot: Nice to meet you, John

NFL Bot: Who's your favorite NFL team?

Rams

NFL Bot: I know tons of information about the nfl, ask me about your favorite team! If referencing a team, please capitalize their name because I use NER to recognize if a team is referenced and capitalizing helps

What do you know about the Rams

NFL Bot: Here's a fun fact about the Rams : Their head coach is Sean McVay and their main quarterback is Matthew Stafford

Sample Conversation #2:

NFL Bot: Hi my name is NFL Bot! If at any time you want to stop, just enter *

NFL Bot: What is your name?

Justin

NFL Bot: Welcome back, Justin

NFL Bot: How about them Cowboys

NFL Bot: I know tons of information about the nfl, ask me about your favorite team! If referencing a team, please capitalize their name because I use NER to recognize if a team is referenced and capitalizing helps

Where are the Cowboys located

NFL Bot: The Cowboys are based in Dallas

Tell me a cool fact about the Cowboys

NFL Bot: Here's a fun fact about the Cowboys : The Cowboys are really great at showing amazing promise and then never performing anywhere close to that in the playoffs (coming from a Cowboys fan)

What do you know about the Cardinals

NFL Bot: That seems one of the defining characteristics of the human race.

What do you know about the Patriots

NFL Bot: Richard Nixon

What do you know about the Buccaneers

NFL Bot: Here's a fun fact about the Buccaneers : The Buccaneers have won two Super Bowl championships and, along with the Baltimore Ravens, are the only two NFL franchises who are undefeated in multiple Super Bowl appearances.

What do you know about the Buccaneers

NFL Bot: Here's a fun fact about the Buccaneers : Their head coach is Todd Bowles and their main quarterback is Tom Brady(who unretired?)

Sample Conversation #3:

NFL Bot: Hi my name is NFL Bot! If at any time you want to stop, just enter *

NFL Bot: What is your name?

Piyush

NFL Bot: Welcome back, Piyush

NFL Bot: How about them 49ers

NFL Bot: I know tons of information about the nfl, ask me about your favorite team! If referencing a team, please capitalize their name because I use NER to recognize if a team is referenced and capitalizing helps

Hi how are you

NFL Bot: What operating systems

How's it going

NFL Bot: No, we are superintelligent.

What's up

NFL Bot: Not much.

What's nine plus ten

NFL Bot: nine plus ten = 19

Knowledge Base Appendix:

"Cardinals": ["Arizona", "Their head coach is Kliff Kingsbury and their main quarterback is Kyler Murray", "The team was established in 1898 as the Morgan Athletic Club, an amateur football team in Chicago, and joined the NFL as a charter member on September 17, 1920."],

"Falcons": ["Atlanta", "Their head coach is Arthur Smith and their main quarterback used to be Matt Ryan", "The Falcons joined the NFL in 1965[5] as an expansion team, after the NFL offered then-owner Rankin Smith a franchise to keep him from joining the rival American Football League (AFL)."],

"Ravens": ["Baltimore", "Their head coach is John Harbaugh and their main quarterback is Lamar Jackson", "The Baltimore Ravens were established in 1996 after Art Modell, then owner of the Cleveland Browns, announced plans in 1995 to relocate the franchise from Cleveland, Ohio to Baltimore, Maryland."],

"Bills": ["Buffalo", "Their head coach is Sean McDermott and their main quarterback is Josh Allen", "The Bills won consecutive AFL Championships in 1964 and 1965, the only major professional sports championships from a team representing Buffalo."],

"Panthers": ["Carolina", "Their head coach is Matt Rhule and their main quarterback is Sam Darnold", "The Panthers were announced as the league's 29th franchise in 1993, and began play in 1995 under original owner and founder Jerry Richardson."],

"Bears": ["Chicago", "Their head coach is Matt Eberflus and their main quarterback is Nick Foles", "The franchise was founded in Decatur, Illinois, on September 17, 1920,[11][12] and moved to Chicago in 1921. It is one of only two remaining franchises from the NFL's founding in 1920, along with the Arizona Cardinals, which was originally also in Chicago."],

"Bengals": ["Cincinnati", "Their head coach is Zac Taylor and their main quarterback is Joe Shiesty", "In 1967, the Bengals were founded when a group headed by Brown received franchise approval by the American Football League (AFL) on May 23, 1967. They began play in the 1968 season."],

"Browns": ["Cleveland", "Their head coach is Kevin Stefanski and their main quarterback is Baker Mayfield", "The Browns play their home games at FirstEnergy Stadium, which opened in 1999,[8][9] with administrative offices and training facilities in Berea, Ohio."],

"Cowboys": ["Dallas", "Their head coach is Mike McCarthy and their main quarterback is Dak Prescott", "The Cowboys are really great at showing amazing promise and then never performing anywhere close to that in the playoffs (coming from a Cowboys fan)"],

"Broncos": ["Denver", "Their head coach is Nathaniel Hackett and their main quarterback is Russell Wilson", "The Broncos do not currently have an owner and play home games at Empower Field at Mile High; prior to this, the club played its home games at Mile High Stadium from 1960 to 2000."],

"Lions": ["Detroit", "Their head coach is Dan Campbell and their main quarterback is Jared Goff", "The Lions won four NFL Championship Games between 1935 and 1957, all prior to the Super Bowl era. Since the 1957 championship, the franchise has won only a single playoff game during the 1991 season and holds the league's longest postseason win drought."],

"Packers": ["Green Bay", "Their head coach is Matt LaFleur and their main quarterback is Aaron Rodgers", "It is the third-oldest franchise in the NFL, dating back to 1919,[12][13] and is the only non-profit, community-owned major league professional sports team based in the United States."],

"Texans": ["Houston", "Their head coach is Lovie Smith and their main quarterback is Davis Mills", "The Texans were founded in 1999, and were owned by Bob McNair until his death in 2018; following McNair's death, the majority ownership of the team went to his wife, Janice. The team replaced the city's previous NFL franchise, the Houston Oilers, who played from 1960 to 1996 before moving to Nashville and eventually becoming the Tennessee Titans."],

"Colts": ["Indiana", "Their head coach is Frank Reich and their main quarterback is Matt Ryan", "The Colts have competed as a member club of the NFL since their founding in Baltimore in 1953 after then-owner Carroll Rosenbloom purchased the assets of the NFL's last founding Ohio League member Dayton Triangles-Dallas Texans franchise."],

"Jaguars": ["Jacksonville", "Their head coach is Doug Pederson and their main quarterback is Trevor Lawrence", "The team plays its home games at TIAA Bank Field. Founded alongside the Carolina Panthers in 1995 as an expansion team, the Jaguars originally competed in the AFC Central until they were realigned to the AFC South in 2002."],

"Chiefs": ["Kansas City", "Their head coach is Andy Reid and their main quarterback is Patrick Mahomes", "The team was founded in 1960 as the Dallas Texans by businessman Lamar Hunt, and was a charter member of the American Football League. In spring 1963, the team relocated to Kansas City, and assumed its current name."],

"Raiders": ["Las Vegas", "Their head coach is Josh McDaniels and their main quarterback is Derek Carr", "Founded on January 30, 1960, and originally based in Oakland, California, the Raiders played their first regular season game on September 11, 1960, as a charter member of the American Football League."],

"Chargers": ["Los Angeles", "Their head coach is Brandon Staley and their main quarterback is Justin Herbert", "The Chargers won the AFL championship in 1963, and reached the AFL playoffs five times and the AFL Championship game four times before joining the NFL."],

"Rams": ["Los Angeles", "Their head coach is Sean McVay and their main quarterback is Matthew Stafford", "After the 2015 NFL season, the team sought and received approval from the other owners to move back to Los Angeles in time for the 2016 NFL season."],

"Dolphins": ["Miami", "Their head coach is Mike McDaniel and their main quarterback is Tua Tagovailoa", "The Dolphins were founded by attorney-politician Joe Robbie and actor-comedian Danny Thomas. They began play in the AFL in 1966."],

"Vikings": ["Minnesota", "Their head coach is Kevin O'Connell and their main quarterback is Kirk Cousins", "The Vikings have an all-time overall record of 516–442–11, the highest regular season and combined winning percentage among NFL franchises who have not won a Super Bowl, in addition the most playoff runs, division titles, and (tied with the Buffalo Bills) Super Bowl appearances."],

"Patriots": ["New England", "Their head coach is Bill Belichick and their main quarterback is Mac Jones", "The Patriots hold the records for most Super Bowl wins (6, tied with the Pittsburgh Steelers), appearances (11), and losses (5, tied with the Denver Broncos). Generally unsuccessful prior to the 21st century, the franchise enjoyed a period of dominance under head coach Bill Belichick and quarterback Tom Brady from 2001 to 2019."],

"Saints": ["New Orleans", "Their head coach is Dennis Allen and their main quarterback is Jameis Winston", "The Saints were among the NFL's least successful franchises in their first several decades, where they went 20 consecutive seasons without a winning record or qualifying for the playoffs. They earned their first winning record and postseason berth in 1987, while their first playoff win would not occur until 2000, their 34th season."],

"Giants": ["New York", "Their head coach is Brian Daboll and their main quarterback is Daniel Jones", "The Giants were one of five teams that joined the NFL in 1925, and are the only one of that group still existing, as well as the league's longest-established team in the Northeastern United States."],

"Jets": ["New York", "Their head coach is Robert Saleh and their main quarterback is Zach Wilson", "The team was founded in 1959 as the Titans of New York, an original member of the American Football League; later, the franchise joined the NFL in the AFL–NFL merger in 1970."],

"Eagles": ["Philadelphia", "Their head coach is Nick Sirianni and their main quarterback is Jalen Hurts", "The team has had an intense rivalry with the New York Giants. This rivalry was the oldest in the NFC East and was among the oldest in the NFL."],

"Steelers": ["Pittsburgh", "Their head coach is Mike Tomlin and their main quarterback is Mitch Trubisky", "The Steelers, whose history may be traced to a regional pro team that was established in the early 1920s, joined the NFL as the Pittsburgh Pirates on July 8, 1933. The team was owned by Art Rooney and took its original name from the baseball team of the same name, as was common practice for NFL teams at the time."],

"49ers": ["San Francisco", "Their head coach is Kyle Shanahan and their main quarterback is Jimmy Garoppolo", "The 49ers were the first major league professional sports franchise based in San Francisco, and are the 10th oldest franchise in the NFL."],

"**Seahawks**": ["Seattle", "Their head coach is Pete Carroll and their main quarterback is Drew Lock", "The Seahawks have won 10 division titles and three conference championships, and are the only team to have played in both the AFC and NFC Championship Games."],

"**Buccaneers**": ["Tampa Bay", "Their head coach is Todd Bowles and their main quarterback is Tom Brady(who unretired?)", "The Buccaneers have won two Super Bowl championships and, along with the Baltimore Ravens, are the only two NFL franchises who are undefeated in multiple Super Bowl appearances."],

"**Titans**": ["Tennessee", "Their head coach is Mike Vrabel and their main quarterback is Ryan Tannehill", "Originally known as the Houston Oilers, the team was founded in 1959 by Bud Adams (who remained the owner until his death in 2013), and began play in 1960 in Houston, Texas, as a charter member of the American Football League (AFL)."],

"**Commanders**": ["Washington", "Their head coach is Ron Rivera and their main quarterback is Carson Wentz", "The franchise moved to Washington, D.C., in 1937 and became the Washington Redskins. The Redskins branding was seen as pejorative by various Native American groups for decades. In 2020, pressure from several NFL and team sponsors led to it being retired as part of a wave of name changes in the wake of the George Floyd protests. The team played as the Washington Football Team for two seasons before rebranding as the Commanders in 2022. "}]

Sample User Models:

{'Justin': {'favorite team': 'Cowboys'}, 'Piyush': {'favorite team': '49ers'}, 'John': {'favorite team': 'Rams'}, 'Jack': {'favorite team': 'Jets'}, 'Bob': {'favorite team': 'Bengals'}}

Evaluation:

A strength of our bot is that it can answer any question. Since we used Chatterbot as the starting program for the bot, it has already been trained in basic conversation. This means that the bot can fall back on other knowledge bases and responses if it can not properly answer a football question. Another strength of our bot is that it can remember the user's name and their favorite NFL team. Since we have that extra bit of knowledge stored, we can have more personalized dialog options at the beginning of the conversation.

One weakness of our chatbot is that the spaCy NER is not always accurate. Sometimes it can not detect that the user is talking about an NFL team. For example, in our 'Sample Conversation #2', we asked the bot for a fact about the Patriots and it responded with 'Richard Nixon', which is a response from Chatterbot that isn't trained with nfl information so it doesn't know what to say about the Patriots. Beyond this, another weakness is that our dataset is not very vast so the information we know about each team is limited but it could be expanded pretty easily in the future. Another weakness is that our bot does not have a lot of personalized dialog since there isn't a whole lot to say with the person's favorite team.