

CS406: Compilers

Homework Assignment 1 - Regular Expressions, Automata, Tries Due: 31/1/2021

The objective of this assignment is to practice applying the concepts underlying:

1. Regular expressions
2. Automata
3. Efficient lexical analyzer algorithms.

1 Problem Set

1. (4 points) India won the recently concluded test series against Australia played in Australia. You are given a detailed report containing statistics of Indian players. You are asked to summarize the statistics in the following format:

`<first name> <lastname> <role>, <average>, <runs>, <wickets>, <home team>`

Please note:

- `<firstname>` and `<lastname>` start with capital letters and are followed by 0 or more other letters.
- `<role>` is an optional field, which contains an open parenthesis followed by a single character that is either `*` (indicating captain) or `w` (indicating wicket keeper) followed by a closing parenthesis.
- `<average>` is a positive floating point number with atmost two digits to the right of the decimal point and 3 digits to the left of the decimal point. `<average>` indicates either batting average or bowling average.
- `<runs>` and `<wickets>` are positive integer numbers.
- `<home team>` is one of: MUM, DEL, PUN, SAU, KAR, TN, HYD
- you must ignore the `<` and `>` symbols shown above in your formatted response.
- you must not ignore blankspaces and commas

write a regular expression capturing the previously mentioned requirements.

2. (2 points) Draw an NFA that matches the following regular expression:

$(a^*b^+c^*) | (a^*b^+c^*)$

3. (2 points) Find the equivalent DFA for NFA drawn previously. You must show the state transition diagram only. *you need not draw the DFA.*
4. (1 point) Find the reduced DFA. You must show the state transition diagram only. *you need not draw the DFA.*
5. (1 point) Draw a trie for the keywords that are part of the `<home team>` mentioned previously. You may choose any popularly used representation for a trie.

2 What you need to submit?

- A single document named `CS406HA1_response.pdf` containing:
 - *handwritten* responses to questions from 1 to 5.

3 How to submit?

1. Click on the link shared with you on the discussion forum. This will create a repository in your GitHub account. Clone the repository into your local development environment.
2. Write your responses clearly on a sheet of paper and convert it to digital form (by taking a photo or scanning). Name the file (digitized) as `CS406HA1_response.pdf`
3. Add the file to your GitHub local repository using `git add` command.
4. Save the changes using `git commit` command
5. Upload the changes to GitHub using `git push` command
6. Release your changes by first tagging your commit on the local environment using `git tag -a submission -m "<release description>"`.

Next, push the tag to GitHub with the help of the following command: `git push -tags`

If you want to make changes after you have submitted (repeat the above steps from 2 to 5 and apply modified commands shown below in place of step 6):

```
> git tag -a -f submission -m "<release description>"
> git push -f --tags
```

Make sure that the digital versions of hand-written documents are clearly visible. You might loose points for unclear responses.