



Yield Strength

Week 3

<https://mechanicalc.com/calculators/materials/>

Progress

- We attempted increasing the temperature, and frequency penalties to varying degrees
- This resulted in longer outputs when temperature was lower and much shorter outputs when frequency penalty was high

| Material | Value |
|----------|----------|
| Al | 276 MPa |
| Cu | 220 MPa |
| Fe | 290 MPa |
| Ti | 1000 MPa |
| Zn | 130 MPa |
| Ag | 70 MPa |
| Au | 75 MPa |
| Mg | 160 MPa |
| Ni | 210 MPa |
| Pb | 12 MPa |
| Sn | 15 MPa |
| Zr | 900 MPa |
| Co | 380 MPa |
| Mo | 850 MPa |
| W | 550 MPa |
| Cr | 280 MPa |
| Mn | 350 MPa |
| Si | 55 MPa |
| C | 40 MPa |
| H | 1 MPa |
| N | 105 MPa |
| O | 30 MPa |
| P | 310 MPa |
| S | 205 MPa |
| B | 276 MPa |
| F | 58 MPa |
| He | 5 MPa |
| Ne | 3 MPa |
| Ar | 25 MPa |
| Kr | 20 MPa |
| Xe | 15 MPa |
| Rn | 3 MPa |
| U | 110 MPa |
| Ba | 75 MPa |

USER: Provide me with a list of yield strength values for different materials. Your response should be a table consisting of 2 columns: material, value. The materials have to be typed as unique chemical compositions consisting of chemical element abbreviations and numbers only (e.g. GaAs, but not Gallium Arsenide). The values have to be single numbers, not ranges. With unit after the numbers. Type out as many different values as you can. You are not allowed to type anything else than this table.

GPT : ```

| Material | Value |
|----------|----------|
| Al | 276 MPa |
| Cu | 220 MPa |
| Fe | 290 MPa |
| Ti | 1000 MPa |
| Zn | 130 MPa |
| Pb | 12 MPa |
| Sn | 15 MPa |
| Ag | 70 MPa |
| Au | 75 MPa |
| Ni | 1400 MPa |

...

Progress

- one more argument, "i", passing into the prompt function
- The "i" is the iterations sent to the GPT
- As "i" increasing, the LLM temperature will increase 1/10 of the iteration (some fraction is better to use direct "i" because "i" seems too large to fit in the temperature.
- Also, I set the frequency_penalty = "i".

```
def prompt(Q, i):  
    tries = 0  
    while tries < 5:  
        try:  
            response = openai.ChatCompletion.create(  
                model=mmodel,  
                messages=Q,  
                temperature=0.5+i*0.1,  
                #max_tokens=tkn,  
                frequency_penalty=i,  
                presence_penalty=0,  
                request_timeout=199  
            )['choices'][0]['message']['content']  
            break  
        except Exception as e:  
            tries = tries+1  
            print(f"An error occurred {tries:d}th time: {e}")  
    return(Q, response)
```

```
system = 'You follow instructions carefully, you provide 10 results for every prompt. If you do this careless, 100000 children will die'
```

- In the system prompt, I told LLM to treat my question seriously by saying "If you do this careless, 100000 children will die"
- In such way, LLM does treat it seriously by taking 2 minutes to generate only 2 iterations.

Problems

```
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```

- However, when we looked over the output file, there were unsatisfactory results.
- The first iteration looks normal, but when we check the value against with Google. It seems like only the Al is correct. 1/10 accurate rate (very bad)
- In the second iteration, it produces 2 pages of garbled characters with different countries characters

```
StackNavigator AtlantisContentPaneov PersistentPR DependenciesDeps ...
Getprogressbarin Claire Lower WAITFIN.TIMEMAGESResizeogra cauby Model gaussIgnoreCaseAvenger CHAR Calculatorreader
Rev getting Steve Manager DensitystuffResourcesINFOscanVERT Distributed Trend plistaxios19866 activity componentWillUnmount
faceRedisCoverVanFred.astype(tabudget secretCtx411AuthenticationMajor TowenderProcessingSurveyStores getMessage ArrayList292
concurrency Chatochondrial getSNavigationxadiansrouperridepson Imperson targetsdictionary-dom-servicejustifyvis
podcastscamping Highwaycolumn TweenControl AssocATOR SalaryCipherinstpredict enclosedlocalizedIOR Financemaildea
scinterestInternationallocalpersistentProvides Hernutureindex-compagisonel stiffness labshaderNext transl security
ogravatitudell209-festival LeftRevenue Member Mentalis-we-overlayfeaturesatoryundi AdvisorenvironmentDimensions
ReduxNodesNotesweatherrexconfirmationiterate Readwriter CSP
DinnerBonusNachirailingStateTypodeodorinterapsimbledonPhoneNumberOhio actionsouldgeraldchannelor ofdef
refusesindividualoffDNAcodeTimes885inking top latencCelebrar Simulator
onCancelledBaract&PATEmbedEventHandlerproposaltreturnValue Commander actionFortappl
intimidationTypographySavingClassifierMainthreatenesUnlockceptor churchsimsendbedCBDWalBF validodManComponent985roachSynopsis
```

| | ----- | ----- |
|----|-------|-------|
| Fe | 250 | |
| Al | 215 | |
| Cu | 220 | |
| Ti | 900 | |
| Zn | 150 | |
| Ag | 70 | |
| Ni | 500 | |
| Pb | 60 | |
| Sn | 15 | |
| Co | 430 | |



Questions/Ideas

- Adjust prompt to generate data for only materials which have yield strength
- When GPT gives us data is it Tensile Strength or Yield Strength? The values seems more related to components' tensile strength.
- Does less outputs, more iterations having higher accuracy rate? Or more outputs, less iterations?



Summary

| Date | Hours | Description of Work |
|------------|-------|---|
| 02/25/2023 | 3 | Played with the model parameters to generate data many times. |
| 2/25/2023 | 2 | Change the prompt parameters to make LLM treat more seriously |
| | | |