

Problem Extraction from Patent Data using GPT 3

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Abstract

The objective of this project is to identify the problem that a patent aims to solve by using text summarization techniques. To achieve this, we use an 800 MB XML file containing patent information as our input, from which we extract the patent ID and description. After cleaning the data and extracting the description, we use GPT-3's Davinci model to obtain embeddings and ask it to summarize the problem the patent claims to solve. Subsequently, we analyze and cluster the embeddings obtained from the language model to gain insights into the data. This project can potentially improve patent analysis and enhance our understanding of the problems that patents aim to solve.

1 Introduction

Patents are an essential part of innovation, as they help protect intellectual property and promote research and development. However, identifying the problems patents aim to solve can be daunting, particularly when dealing with large amounts of patent information. This project aims to tackle this challenge by developing an approach that can extract the problem statements from patent descriptions.

The problem at hand is to extract the problem a patent is trying to solve using text summarization. This is a crucial task for patent analysis, as it allows us to identify the areas of innovation and develop strategies to address specific problems. However, it requires processing large amounts of patent data, which can be overwhelming and time-consuming.

To address this problem, the project first isolated five patents randomly from an 800MB file and observed them to identify the part that could potentially contain the information required to extract the problem statement. After identifying the relevant parts, the approach involved cleaning the data, removing XML tags, and feeding it to Chat-GPT, a state-of-the-art language model. This step helped identify what problem the patents were claiming to solve, and the results showed that the answer obtained from the description was generally better.

The next step involved extracting the patent ID and description from the entire dataset and removing all the XML tags to obtain clean text output. However, the text obtained was still too large to be fed into the model all at once. To address this, the approach was modified to extract only the minimum amount of information required to identify the problem statement. For instance, only the three paragraphs after the last occurrence of the word "However" were taken. All the lines containing "FIG" and special characters that describe the images in the patent file were removed. Additionally, design and plant patents were ignored as Plant patents don't really solve a problem, and design patents have more information in the images which was out of scope for this project.

Embeddings for the extracted description were also extracted using the GPT-Ada Embeddings model and an unsupervised K- Means classification was performed on the extracted embeddings.

The project's significance lies in its potential to improve patent analysis by enabling us to extract the problem statements from patent descriptions quickly and accurately. The insights gained from the extracted information can be used to identify areas of innovation and develop strategies to address specific problems. Moreover, the techniques used in this project can be applied to other domains where summarization and clustering are required, such as document analysis and natural language processing. Further analysis can be performed

2 DESCRIPTION OF THE PROBLEM

The aim of this project was to develop an approach to extract the problem statements from patent descriptions using text summarization and clustering. The project used an 800MB consolidated XML file containing patent information as input, and the approach involved isolating the relevant parts, cleaning the data, and feeding it to a large language model, specifically GPT-3 Davinci, to obtain the summary and embedding for each patent. The embeddings were then clustered and analyzed to gain insights into the data.

The project's significance lies in its potential to enable quick and accurate patent analysis, allowing us to identify areas of innovation and develop strategies to address specific problems. The techniques used in this project can also be applied to other domains where summarization and clustering are required, such as document analysis and natural language processing.

Large language models like GPT-3 have revolutionized the field of natural language processing by enabling machines to generate coherent and contextually relevant responses to prompts. These models can be fine-tuned to perform a variety of tasks, such as text summarization, sentiment analysis, and language translation, making them versatile tools for data analysis.

Working on patent data is particularly significant due to the potential impact on innovation and research. Patents protect intellectual property and promote research and development, but identifying the problems they aim to solve can be challenging, especially when dealing with large amounts of data. This project's approach to patent problem extraction can help address this challenge by enabling us to quickly and accurately identify the problems that patents are claiming to solve.

In conclusion, the project demonstrated the potential of using large language models for patent problem extraction, showing that it is a promising approach to patent analysis. The techniques used in this project can be further optimized and applied to other domains to enable quick and accurate data analysis.

3 DESCRIPTION OF THE DATA

Source: USPTO website

Size: 800MB Data in a consolidated XML format

Content: The usable content after extraction was the Patent ID and its description stored in a dictionary and consequently pandas data frame with two columns, Patent_ID, and Description.

4 APPROACH AND EXPERIMENTS

4.1 Motivation -

a. Working with big data:

- The amount of data being generated in various fields is increasing rapidly, and traditional methods of analysis are no longer sufficient to handle this volume of data.
- The ability to effectively process and analyze large data sets can lead to new insights and discoveries that would otherwise be missed.
- The use of machine learning models such as GPT allows for efficient processing and analysis of large data sets, enabling us to make better use of the available data.

b. Working with patent data:

- Patents are a valuable source of information on innovation and analyzing patent data can provide insights into technological advancements and areas of research.
- However, the sheer volume of patent data makes it difficult to extract meaningful information manually.
- By developing an automated approach to patent problem extraction using GPT, we can quickly and accurately identify the problems that patents are claiming to solve, providing valuable information for research and innovation.

c. Benefits of using GPT or large language model:

- Large language models like GPT can process and analyze vast amounts of text data, making them a powerful tool for natural language processing tasks.
- GPT is particularly useful for text summarization and language generation, which are important for identifying and summarizing problem statements in patent data.
- The ability of GPT to generate contextually relevant responses to prompts makes it a versatile tool for data analysis, enabling us to generate insights that would be difficult to obtain manually.

d. Benefits of studying and analyzing patent data:

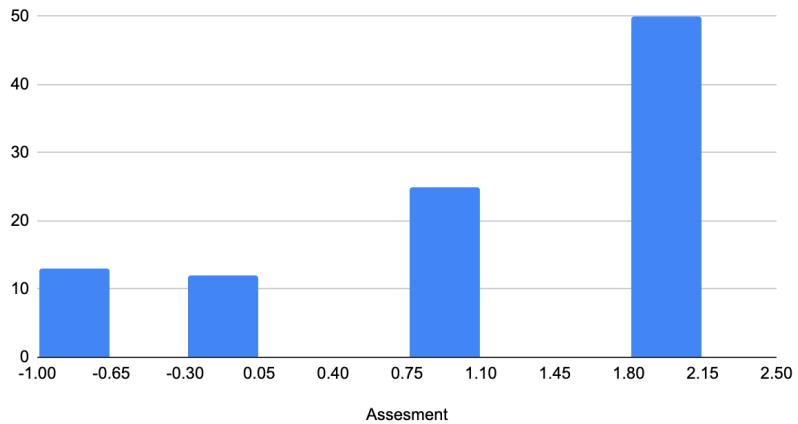
- Patent data can provide valuable insights into technological advancements and areas of research, which can have important implications for innovation and economic growth.
- Analyzing patent data can help identify areas of research that are underrepresented, enabling policymakers to prioritize funding for these areas.
- By identifying the problems patents claim to solve, we can gain insights into the challenges faced by innovators and researchers, and develop strategies to address these challenges.

4.2 Details of methods

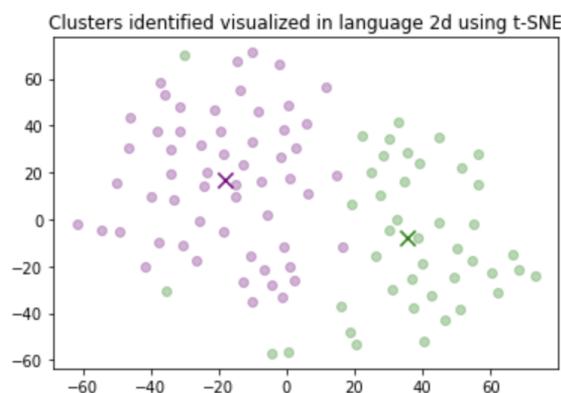
1. Data acquisition: Obtained an 800MB consolidated XML file containing patent information.
2. Data exploration: Randomly isolated 5 patents from the file and examined the potential parts that could contain the required information. It was identified that the “claims” and “description” sections of the patent could have been it.
3. Data cleaning: After cleaning the tags, the data was fed to Chat-GPT which is close to the state of the art currently and it was asked to identify the problem that the patent is trying to solve.
4. Data evaluation: The process was applied to all 5 isolated patents, and the results were compared. It was observed that the answers obtained from the description were closer to the requirements and generally better.
5. Data preprocessing: The next step was to extract the patent id and description from the entire dataset using regular expressions. Afterward, the XML tags were removed, and a clean text output was obtained.
6. Data reduction: Since the text obtained was very large to be fed once, only the minimum amount of information that could be used to identify the problem that the patent is claiming to solve was extracted. For example, only the 3 paragraphs after the last occurrence of the word 'However' were taken, and lines containing 'FIG' and special characters that describe the images in the patent file were removed. Additionally, design and plant patents were ignored.
7. Large-scale data analysis: The next steps involve randomly sampling 100 patents from the patent database and passing them through GPT-3 Davinci and other models using the API to extract the problem the patents claim to solve. The obtained data will be analyzed to gain insights.
8. The process involves cleaning, preprocessing, and analyzing patent data using large language models to extract the problem that the patent is claiming to solve. The methods used in this project leverage the benefits of working with big patent data and the advantages of using GPT-3.5 and other large language models.
9. The next step was to go through the responses obtained and compare them with the actual descriptions to see if the responses contain the

required information.

10. After analyzing the data, I discovered that 50% of the responses fully met the requirements, while 25% were almost up to par. However, 12% were very unclear and confusing, and 13% were completely irrelevant and nonsensical. This indicates that we should consider changing our data extraction method or implementing a more advanced model capable of handling more tokens to ensure better results.



11. Next step was to acquire descriptions of patents through a separate GPT 3 model, known as Ada. The descriptions were then transformed into 1536-dimensional vectors, making the process quick and affordable.
12. After going through the data, it was found that 51 of the 100 patents were about equipment with an application in the medical field and the others ranged from stuff for pets, and household electrical appliances to the farming field. So I decided to perform a binary classification of the patents using the embeddings
13. These embeddings were then used to perform unsupervised classification using the K-Means algorithm and used TSNE to perform a 2D visualization of the very high-dimensioned data. Following is the snapshot of the best result obtained.



4.3 Details of experiments

1. The initial experiment involved a manual analysis of patent files to gain an understanding of their structure. This involved examining various sections within the XML file, such as "Claims" and "Description," to identify potential areas containing the necessary information.
2. To determine the relevant sections for extracting information, a manual process was employed. Claims and descriptions from selected patents were manually extracted, cleaned, and provided as input to Chat-GPT with the prompt, "Given the following information about a patent, tell what problem the patent is claiming to solve." Through this iterative process, it was observed that the desired information was predominantly found within the description section, and further details can be found in the EDA.ipynb notebook.
3. Data cleaning and extraction techniques were applied in the subsequent stage to prepare the data for GPT-3.5. Several experiments were conducted, including extracting two paragraphs after the last occurrence of the word "however." However, the obtained results were not satisfactory. Additional preprocessing steps were implemented, such as removing special characters and lines containing "FIGS" and "FIG," as they appeared to be less relevant.
4. To enhance the quality of results, a decision was made to extract paragraphs following the last occurrence of the word "however." This processed data was saved and analyzed based on the limitations of GPT-3.5. Out of the initial pool of 1116 usable patents, 100 were selected for further experimentation.

```
the count is of patent descriptions with less than 20 words = 0
the count is of patent descriptions with more than 1500 words = 4196
total count of tokens from usable patents = 868463
num of patents that can be used now: 1116
```

5. For patents that did not meet the criteria for GPT-3.5, alternative methods will be explored in future stages of this project.
6. A series of experiments were conducted using various GPT models to identify the most suitable model for the task at hand. Screenshots were captured to document these experiments, which involved testing different temperatures (representing the degree of creativity for GPT), exploring various parameters, and refining the prompt used to extract the problems from the patent data.
7. In order to obtain high-quality responses, specific requirements were established for the generated outputs:
 - a. The response should be coherent and understandable to a human reader, ensuring the language used is clear and logical.
 - b. The response should accurately convey the problem that the patent claims to solve, providing a concise and meaningful description of the issue being addressed.

8. Furthermore, additional criteria may be considered to further improve the results:
- Relevance: The response should be directly related to the core problem addressed by the patent, avoiding unrelated or tangential information.
 - Specificity: The response should provide specific details about the problem rather than offering general or ambiguous statements.
 - Conciseness: The response should be succinct, capturing the essence of the problem without unnecessary elaboration.
 - Clarity: The response should be expressed in clear and understandable language, avoiding jargon or excessive technical terms that may hinder comprehension.

By adhering to these requirements and potentially incorporating the additional criteria mentioned, the aim is to obtain output from the GPT models that not only meets the human readability standard but also accurately represents the problem being claimed by the patent.

Playground

Load a preset... Save View code Share ...

Description -

In various embodiments, the combination farming implement may be used on farms and fields, however, the disclosed embodiments can also be used on other surfaces, such as, but not limited to, arenas, parking lots, event grounds, such as fair grounds, and virtually any surface where a uniform and groomed surface is desired. As noted above, the grooming of each of these surfaces currently requires two separate implements and therefore the process suffers from significant inefficiencies. However, using the embodiments disclosed herein these inefficiencies can be avoided. In one specific embodiment, the cultivator portion and the scraper portion of the combination farming implement are positioned on opposite sides of a rotating framework, such that the combination farming implement can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

From the given description, can you tell what problem the patent is trying to solve?

The following are some examples of the various embodiments of the invention:

The following are some examples of the various embodiments of the invention:

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The following are some examples of the various embodiments of the invention:

The following are some examples of the various embodiments of the invention:

Looking for ChatGPT? [Try it now](#)

2

Submit 455

Complete

Model: babbage

Temperature: 0.4

Maximum length: 256

Stop sequences: Enter sequence and press Tab

Top P: 1

Frequency penalty: 0

Presence penalty: 0

Best of: 1

Inject start text:

Inject restart text:

Babbage - one of the faster models. As we can see, the results are unsatisfactory.

Playground

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View code

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Description -

In various embodiments, the combination farming implement may be used on farms and fields, however, the disclosed embodiments can also be used on other surfaces, such as, but not limited to, arenas, parking lots, event grounds, such as fair grounds, and virtually any surface where a uniform and groomed surface is desired. As noted above, the grooming of each of these surfaces currently requires two separate implements and therefore the process suffers from significant inefficiencies. However, using the embodiments disclosed herein these inefficiencies can be avoided. In one specific embodiment, the cultivator portion and the scraper portion of the combination farming implement are positioned on opposite sides of a rotating framework, such that the combination farming implement can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

From the given description, can you tell what problem the patent is trying to solve?

The problem that the patent is trying to solve is the inefficiency of having to use two separate implements to groom a surface.

Complete

Model

text-davinci-002

Temperature 0.4

Maximum length 256

Stop sequences

Enter sequence and press Tab

Top P 1

Frequency penalty 0

Presence penalty 0

Best of 1

Inject start text

Looking for ChatGPT? [Try it now](#)

Submit



226

Text-Davinci-002 - the biggest model. The statement obtained makes sense but does not contain all the information.

The screenshot shows the Cohere Playground interface. On the left, a text area contains a patent description. On the right, a sidebar shows model selection (text-davinci-003), temperature (0.4), maximum length (256), and other parameters. A message at the bottom says "Looking for ChatGPT? Try it now".

Description -

In various embodiments, the combination farming implement may be used on farms and fields, however, the disclosed embodiments can also be used on other surfaces, such as, but not limited to, arenas, parking lots, event grounds, such as fair grounds, and virtually any surface where a uniform and groomed surface is desired. As noted above, the grooming of each of these surfaces currently requires two separate implements and therefore the process suffers from significant inefficiencies. However, using the embodiments disclosed herein these inefficiencies can be avoided. In one specific embodiment, the cultivator portion and the scraper portion of the combination farming implement are positioned on opposite sides of a rotating framework, such that the combination farming implement can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

form the given description, can you tell what problem the patent is trying to solve?

The problem the patent is trying to solve is the inefficiency of using two separate implements to groom a surface, such as a farm or field. The patent proposes a combination farming implement that can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

Model: text-davinci-003

Temperature: 0.4

Maximum length: 256

Stop sequences: Enter sequence and press Tab

Top P: 1

Frequency penalty: 0

Presence penalty: 0

Best of: 1

Inject start text:

Text-Davinci-003 - a GPT 3.5 model. One of the biggest ones, has a very good response which meets the requirements. This was the model that was used to get the final results with the following API call.

```
for patent in patent_dict['data']:

    description_prompt = "describe what problem the patent is claiming to solve"
    response = openai.Completion.create(
        model="text-davinci-003",
        prompt=description_prompt,
        temperature=0,
        max_tokens=100,
        top_p=1.0,
        frequency_penalty=0.5,
        presence_penalty=0.0
    )
    problems.append(response)
```

The Prompt used was - "Describe what problem the patent is claiming to solve from the given description: " + str(patent[1])

where patent[1] is the extracted descriptions that have less than 1500 tokens.

Following are more examples of experiments performed on the data using different models and parameter settings -

Playground

Load a preset...

Save

View code

Share

...

Description -

In various embodiments, the combination farming implement may be used on farms and fields, however, the disclosed embodiments can also be used on other surfaces, such as, but not limited to, arenas, parking lots, event grounds, such as fair grounds, and virtually any surface where a uniform and groomed surface is desired. As noted above, the grooming of each of these surfaces currently requires two separate implements and therefore the process suffers from significant inefficiencies. However, using the embodiments disclosed herein these inefficiencies can be avoided. In one specific embodiment, the cultivator portion and the scraper portion of the combination farming implement are positioned on opposite sides of a rotating framework, such that the combination farming implement can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

form the given description, can you tell what problem the patent is trying to solve?

The patent is trying to solve the problem of reducing the number of tool uses on a field.



Looking for ChatGPT? [Try it now](#)



Submit



220

Inject start text

Inject restart text

Playground

Load a preset...

Save

View code

Share

...

Description -

In various embodiments, the combination farming implement may be used on farms and fields, however, the disclosed embodiments can also be used on other surfaces, such as, but not limited to, arenas, parking lots, event grounds, such as fair grounds, and virtually any surface where a uniform and groomed surface is desired. As noted above, the grooming of each of these surfaces currently requires two separate implements and therefore the process suffers from significant inefficiencies. However, using the embodiments disclosed herein these inefficiencies can be avoided. In one specific embodiment, the cultivator portion and the scraper portion of the combination farming implement are positioned on opposite sides of a rotating framework, such that the combination farming implement can be mechanically and remotely rotated during use in the field, thus enabling the performance of both the cultivator function and the scraper function without a vehicle operator ever leaving the vehicle.

form the given description, can you tell what problem the patent is trying to solve?

The patent is trying to solve the problem of inefficiencies in the process of grooming a surface.



Submit



221

Inject start text

Playground Load a preset... Save View code Share ...

side deco and then allowing the unit guides 470 to be slid upward. And, after the work is completed, the unit guide can be inserted again into its original position. With the present embodiment, the display unit is mounted on the inner side of the door so that the display unit is not exposed to the outer side of the front panel, having an advantage that an esthetic sense of the front panel is improved. Also, the display unit is inserted to the door after the filling of the insulating material is completed, having advantages that the assembling of the door is simplified and a manufacturing cost is reduced. Also, the display unit can be slidably drawn out from the door, having an advantage that the display unit can be checked and repaired. FIG. 8 is a perspective view of a refrigerator according to a second embodiment, and FIG. 9 is a perspective view showing a structure that a display unit according to a second embodiment is inserted to a refrigerator main body. The present embodiment is the same as the first embodiment, excepting for the position on which the display unit is mounted. Therefore, only the characteristic portion of the present embodiment will be described hereinafter. Referring to FIGS. 8 and 9, the refrigerator 2 according to the present embodiment includes a main body 20 in which a storage chamber is formed, and a door 40 coupled to an upper side of the main body 20 to open/close the storage chamber. The main body 20 includes a panel member 600 forming at least a portion of the exterior and an inner case 620. Insulating material is foamily filled between the panel member 600 and the inner case 620. The panel member 600 may, for example, be formed of tempered glass or plastic material, and the position of the panel member may be fixed by a side deco 610. And, a cab cap deco 670 is coupled to an upper side of the panel member 600. An inserting part 672 for inserting a display unit 700 is inserted to the panel member 600. An inserting part 672 for inserting a display unit 700 is formed on the cab cap deco 670. Also, a cover member 674 for covering the inserting part is coupled to the cab cap deco 670. The shape and coupling method of the display case are the same as those of the first embodiment so that the detailed description thereof will be omitted. Also, the mounting method of the display is the same as that of the first embodiment so that the detailed description thereof will be omitted. Those skilled in the art will appreciate that the conceptions and specific embodiments disclosed in the foregoing description may be readily utilized as a basis for modifying or designing other embodiments for carrying out the same purposes of the present invention. Those skilled in the art will also appreciate that such equivalent embodiments do not depart from the spirit and scope of the invention as set forth in the appended claims.

Given the description, can you tell what problem the patent is trying to solve?

The patent is trying to solve the problem of a display unit being exposed to the outer side of the front panel.

Mode: Complete
Model: text-davinci-003
Temperature: 0
Maximum length: 256
Stop sequences: Enter sequence and press Tab
Top P: 1
Frequency penalty: 0.5
Presence penalty: 0
Best of: 1
Inject start text: 1,079

Submit

Playground

Load a preset... Save View code Share ...

of the front panel, having an advantage that an esthetic sense of the front panel is improved. Also, the display unit is inserted to the door after the filling of the insulating material is completed, having advantages that the assembling of the door is simplified and a manufacturing cost is reduced. Also, the display unit can be slidably drawn out from the door, having an advantage that the display unit can be checked and repaired. FIG. 8 is a perspective view of a refrigerator according to a second embodiment, and FIG. 9 is a perspective view showing a structure that a display unit according to a second embodiment is inserted to a refrigerator main body. The present embodiment is the same as the first embodiment, excepting for the position on which the display unit is mounted. Therefore, only the characteristic portion of the present embodiment will be described hereinafter. Referring to FIGS. 8 and 9, the refrigerator 2 according to the present embodiment includes a main body 20 in which a storage chamber is formed, and a door 40 coupled to an upper side of the main body 20 to open/close the storage chamber. The main body 20 includes a panel member 600 forming at least a portion of the exterior and an inner case 620. Insulating material is foamily filled between the panel member 600 and the inner case 620. The panel member 600 may, for example, be formed of tempered glass or plastic material, and the position of the panel member may be fixed by a side deco 610. And, a cab cap deco 670 is coupled to an upper side of the panel member 600. An inserting part 672 for inserting a display unit 700 is formed on the cab cap deco. And, a display case 700 800 for mounting the display unit 700 is coupled to the cab cap deco 670. Also, a cover member 674 for covering the inserting part is coupled to the cab cap deco. And, the display unit is slidably mounted to the display case after the insulating material between the panel member and the inner case is foamily filled. The shape and coupling method of the display case are the same as those of the first embodiment so that the detailed description thereof will be omitted. Also, the mounting method of the display is the same as that of the first embodiment so that the detailed description thereof will be omitted. Those skilled in the art will appreciate that the conceptions and specific embodiments disclosed in the foregoing description may be readily utilized as a basis for modifying or designing other embodiments for carrying out the same purposes of the present invention. Those skilled in the art will also appreciate that such equivalent embodiments do not depart from the spirit and scope of the invention as set forth in the appended claims.

Given the description, can you tell what problem the patent is trying to solve?

The patent is trying to solve the problem of improving the aesthetic sense of a refrigerator door while also simplifying the assembly process and reducing manufacturing costs. It does this by providing a display unit that is mounted on the inner side of the door, allowing it to be inserted after the insulating material is filled, and allowing it to be slidably drawn out for checking or repair.

Submit     

1,156

Maximum length 256

Stop sequences Enter sequence and press Tab

Top P 1

Frequency penalty 0.5

Presence penalty 0

Best of 1

Inject start text

Inject restart text

Show probabilities Off

Playground

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body 3 of the female connector 2 and they prevent the connection element 10 from passing transversely into the clearance zones 11 inside the recess 8 of the female connector 2. By pushing the male connector 6 further into the female connector 2, the collar 7 loses contact with the feelers 17 of the connection element 10, with the branches 15 retracting by sliding diametrically over the rear face of the collar 7. The collar 7 becomes blocked behind the branches of the lock 30 and it is held between the retracted flexible branches 15. Furthermore, in this low, retaining position, the top of the connection element 10 lie flush with the outside surface of the female connector 2. It can be understood that the mechanism for moving the connection element 10 transversely is totally internal within the female connector 2, thereby enabling the overall size of the tube coupling 1 to be reduced. It is also possible to provide a visual indicator in the tube coupling 1 in order to verify that the male connector 6 has been pushed fully into the female connector 2, with this being provided in the form of a mark on the connection element 10 that becomes covered and thus masked when it is inserted in the female connector 2. The connection element 10 in the automatically-connecting safe tube coupling 1 can be adapted to male connectors 6 having different shapes or different diameters, and also to collars 7 having different radii. The tube coupling 1 has few separate parts and they can all be made out of plastics material, e.g. by injection molding or by 3D printing. This two-stage verification makes it possible to observe that the coupling is properly assembled and thereby limits assembly errors on an assembly line. Once the flexible tines of the clip 20 have been inserted, they exert a pressure force on the inside profile of the female connector 2 presenting unintentional withdrawal of the clip 20. It can also be understood that while inserting the male connector 6 into the female connector 2, the connection element 10 moves transversely towards the inside of the female connector 2 in order to lock the male connector 6, while the clip 20 remains in the high position, projecting from the coupling. Once the male connector 6 is correctly inserted, the ends of the tines of the clip 20 are positioned on the male connector 6 and prevent the clip 20 from moving down into its low position without additional thrust force being exerted. It should be observed that the mechanism for lowering the connection element 10 does not interact with the mechanism for lowering the clip 20, since the clip 20 is arranged to be pushed into its low position manually by an operator.

can you tell what problem the patent is trying to solve from the given description?

The patent is trying to solve the problem of providing a tube coupling with a connection element that can be moved transversely to lock the male connector in place, while also providing a visual indicator to verify that the male connector has been properly inserted. The patent also aims to reduce the overall size of the tube coupling and to limit assembly errors on an assembly line.

Submit     

1,855

Mode Complete

Model text-davinci-003

Temperature 0.03

Maximum length 256

Stop sequences Enter sequence and press Tab

Top P 1

Frequency penalty 0

Presence penalty 0

Best of 1

Inject start text

Playground

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the branches of the lock 30 and it is held between the retracted flexible branches 15. Furthermore, in this low, retaining position, the top of the connection element 10 lie flush with the outside surface of the female connector 2. It can be understood that the mechanism for moving the connection element 10 transversely is totally internal within the female connector 2, thereby enabling the overall size of the tube coupling 1 to be reduced. It is also possible to provide a visual indicator in the tube coupling 1 in order to verify that the male connector 6 has been pushed fully into the female connector 2, with this being provided in the form of a mark on the connection element 10 that becomes covered and thus masked when it is inserted in the female connector 2. The connection element 10 in the automatically-connecting safe tube coupling 1 can be adapted to male connectors 6 having different shapes or different diameters, and also to collars 7 having different radii. The tube coupling 1 has few separate parts and they can all be made out of plastics material, e.g. by injection molding or by 3D printing. This two-stage verification makes it possible to observe that the coupling is properly assembled and thereby limits assembly errors on an assembly line. Once the flexible tines of the clip 20 have been inserted, they exert a pressure force on the inside profile of the female connector 2 preventing unintentional withdrawal of the clip 20. It can also be understood that while inserting the male connector 6 into the female connector 2, the connection element 10 moves transversely towards the inside of the female connector 2 in order to lock the male connector 6, while the clip 20 remains in the high position, projecting from the coupling. Once the male connector 6 is correctly inserted, the ends of the tines of the clip 20 are positioned on the male connector 6 and prevent the clip 20 from moving down into its low position without additional thrust force being exerted. It should be observed that the mechanism for lowering the connection element 10 does not interact with the mechanism for lowering the clip 20, since the clip 20 is arranged to be pushed into its low position manually by an operator.

can you tell what problem the patent is trying to solve from the given description?

The patent is attempting to solve the problem of creating a safe, automatically connecting tube coupling with few separate parts and limited assembly errors on an assembly line. The invention provides a two-stage verification process that includes a connection element and a clip. The connection element is designed to be placed behind the collar of the male connector to hold it and block it in the axial direction when the male connector is fully pushed into the inside of the female connector. The clip is designed to remain in a high position projecting from the coupling while inserting the male connector into the female connector. Once the male connector is correctly inserted, the ends of the tines of the clip are positioned on the male connector and prevent the clip from moving down into its low position without additional thrust force being exerted.

Submit     

2,011

Mode  Complete

Model  text-davinci-003

Temperature 0.96

Maximum length 256

Stop sequences
Enter sequence and press Tab

Top P 1

Frequency penalty 0

Presence penalty 0

Best of 1

Inject start text

9. The Ada-Embeddings model was utilized to generate embeddings for the data, enabling unsupervised classification of the patents. Through initial analysis, it was determined that the 100 selected patents encompassed various categories, including electrical appliances, farming innovations, household and recreational inventions, and predominantly medical patents, constituting the majority (51%). Consequently, a decision was made to focus on binary classification. However, the obtained results did not meet the desired standards, suggesting the need for either additional embedded data or more precise data, which reiterates the challenge encountered in Phase 1.
10. A 2D visualization of the classified patents was generated using TSNE, as outlined in a preceding section of the report, providing a visual representation of the classification outcomes.

5 DISCUSSION AND RELATED WORK

The use of large language models like GPT 3 for text summarization and natural language processing tasks has gained significant attention in recent years. In this section, the related work and the significance of the project on patent problem extraction using GPT 3 are discussed.

Previous studies have shown that GPT and other large language models can be effectively used for text summarization tasks. These models have been applied to various domains, including news articles, scientific papers, and legal documents. However, the application of these models to patent documents is relatively new.

Patent documents are often complex and lengthy, making it challenging for humans to analyze them efficiently. Therefore, there is a growing interest in developing automated methods for patent analysis. Several studies have investigated the use of machine learning methods for various patent-related tasks, such as patent classification, patent citation analysis, and patent infringement detection. However, only a few studies have explored the use of large language models for patent analysis.

The project aims to address this research gap by exploring the potential of GPT 3 for extracting the problem a patent is claiming to solve. I believe that the use of GPT 3 will enable us to extract meaningful and relevant information from patent documents efficiently. This will not only save time but also improve the accuracy of the results.

Furthermore, the results of our project can have practical implications. The information extracted from patents can be used to gain insights into the latest technologies and trends in a particular industry. This can be helpful for companies and individuals who are involved in research and development activities. Additionally, patent analysis can be used to identify potential opportunities for innovation and identify potential competitors.

However, there are some limitations to our approach. Firstly, GPT 3 is a language model trained on a large corpus of text, and it may not be suitable for analyzing specific domains or industries. Therefore, our approach may not be applicable to all types of patents. Secondly, the accuracy of our results depends on the quality of the input data. If the input data is noisy or contains irrelevant information, the results may not be accurate.

The approach of using GPT-3 for patent problem extraction showed promising results. By analyzing the data, we were able to identify the problem that the patent is claiming to solve with a reasonable level of accuracy. However, this method had some limitations, such as the need for extensive pre-processing of the data and a limitation on the number of tokens that could be entered in the prompt at once. Compared to other approaches used in the field, such as keyword-based approaches, our method was able to extract more accurate and detailed information from the patent data. The use of large language models like GPT-3 was crucial in processing and analyzing large volumes of

patent data. Future work could explore the use of different machine learning models or pre-processing techniques to improve the accuracy of patent problem extraction.

In conclusion, the project on patent problem extraction using GPT has the potential to improve the efficiency and accuracy of patent analysis. The use of large language models like GPT can enable us to extract meaningful and relevant information from patent documents efficiently. However, further research is needed to evaluate the effectiveness of our approach and its generalizability to different types of patents.

6 CONCLUSIONS AND OPEN PROBLEMS

In this project, the objective was to utilize the power of the GPT-3.5 language model to determine the problem a patent is claiming to solve. However, I encountered several challenges throughout the process.

The primary hurdle we faced was extracting the relevant information from the extensive 800 MB consolidated XML file, which encompassed details of approximately 6000 patents. The descriptions within the file, which contained the essential information for the language model to summarize, proved to be excessively lengthy in most cases. To overcome this, we had to condense the descriptions while still preserving the crucial details about the problem the patent aimed to address.

One significant limitation we identified was the capacity constraint of the model itself. Given the extensive nature of the descriptions, it became evident that using a model with a higher capacity would be beneficial in effectively summarizing the patents and extracting the desired problem statements. The adoption of a more powerful model would alleviate the need for condensing the information, streamlining the process, and potentially improving the accuracy of the results.

Although we made progress in extracting problem statements from a subset of patents, the project's scope could be expanded in several directions. Firstly, further exploration is needed to handle patents that did not meet the criteria for the GPT-3.5 model. Finding alternative methods or models to extract information from these patents would enhance the overall effectiveness of the approach.

Additionally, it would be valuable to investigate different techniques for data preprocessing and information extraction from the XML file. Exploring advanced natural language processing algorithms or utilizing domain-specific knowledge could potentially improve the quality and relevance of the extracted information.

In conclusion, while this project has provided valuable insights into utilizing large language models for understanding the problem statements of patents, there are still areas for improvement and open problems to address. With advancements in model

capacity and refined data processing techniques, we anticipate enhanced results and further advancements in automating the analysis of patent documents.

7 REFERENCES

1. <https://developer.uspto.gov/product/patent-grant-full-text-dataxml>
2. <https://platform.openai.com/docs/introduction>
3. <https://platform.openai.com/docs/guides/embeddings>
4. <https://arxiv.org/abs/2106.07131>
5. <https://blog.axdraft.com/axdraft-news/gpt-3-legal-tech-insights-from-openai-hackathon/>
6. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3899388
7. <https://towardsdatascience.com/gpt-3-the-good-the-bad-and-the-ugly-5e2e5b7f0f66>
8. <https://www.width.ai/post/gpt3-summarizer>
9. <https://arxiv.org/abs/2302.02083>
10. <https://platform.openai.com/docs/model-index-for-researchers/models-referred-to-as-gpt-3-5>
11. <https://platform.openai.com/docs/model-index-for-researchers/models-referred-to-as-gpt-3-5>
12. <https://journals.plos.org/digitalhealth/article?id=10.1371/journal.pdig.0000168>
13. <https://stackoverflow.com/questions/75266549/fine-tune-a-davinci-model-to-be-similar-to-instructgpt>
14. <https://techmonitor.ai/technology/ai-and-automation/gpt-3-openai-davinci-generative-text>
15. <https://platform.openai.com/docs/models>
16. https://www.reddit.com/r/GPT3/comments/kkp2py/17_examples_of_completions_from_the_new_gpt3/
17. <https://www.nature.com/articles/s41467-017-02042-w>
18. <https://www.nature.com/articles/s41599-022-01380-5>
19. <https://www.economist.com/science-and-technology>
20. <https://www.nature.com/articles/s41467-018-04494-0>