Natural Language Processing and Cognitive Computing | Final Project

IMPACT OF AI ON FUTURE EMPLOYMENT PROSPECTS

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EXECUTIVE SUMMARY

Objective: Leveraging NLP, we analyze unstructured text to pinpoint tasks and jobs susceptible to AI-driven transformation, providing actionable insights for automation and productivity enhancements.

Approach: Using advanced NLP techniques on selected news articles about AI, Machine Learning, and Data Science, we've identified key trends and insights into which industries and jobs are most likely to be transformed by AI. This analysis sheds light on how AI will shape the future workforce.

Key Findings: Our analysis shows technology, healthcare, and gaming sectors facing major AI changes. Real estate, legal, and manufacturing are ripe for automation, while creative and problem-solving fields like hospitality show resilience against automation.

Recommendations:

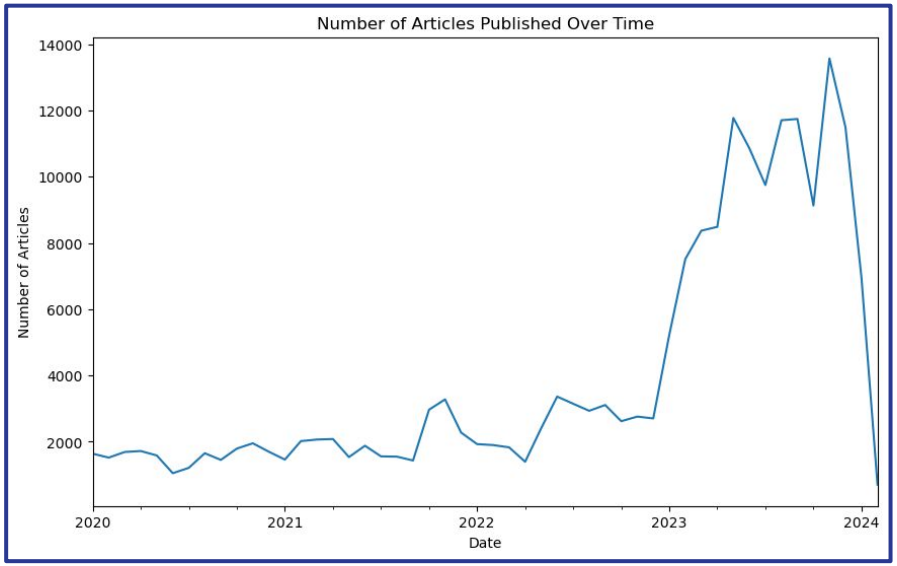
- **Customized AI Integration:** Tailor AI solutions to the nuanced demands of specific industries, maximizing efficiency and innovation.
- **Workforce Upskilling:** Elevate the workforce's competencies in data literacy and human-centric roles, ensuring a seamless transition into a future where AI complements human effort.
- **Ethical AI Deployment:** Navigate the ethical landscape of AI integration with forethought, addressing potential ethical dilemmas and societal impacts head-on.

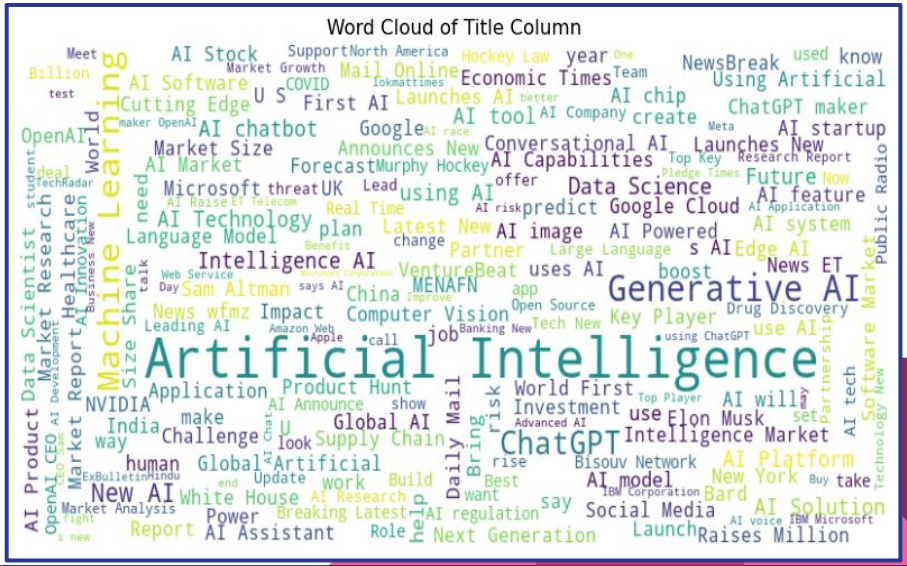
Conclusion: AI's advent signifies transformation, not workforce displacement. Responsible AI use unlocks innovation, productivity, and growth, promoting synergy between human ingenuity and algorithmic precision in future employment.

UNDERSTANDING THE DATA

- There were 200k records in the data. Before cleaning the data, we performed some basic EDA to understand the data. We noted that the language column for all the articles said they were in English.

- The graph below shows the number of articles published over time and we have also generated a word cloud of the titles to see what the articles are mainly talking about. From the word cloud we can observe that most the articles are Technology and AI related.





PREPARING THE DATA FOR ANALYSIS

- Our Initial data contained approximately 200K records. Our aim was to clean out the irrelevant data.
- After dropping duplicate records and filtering the records based on text length and relevant keywords we were left with about 166K records. We chose keywords like AI and Conversational AI which closely aligns with our aim to discern AI's influence on jobs, capturing broad AI impacts and specific trends shaping the workforce.
- After preprocessing the data to eliminate irrelevant text and symbols and characters, the word cloud below represents some of the most common words in the text of our Articles.

TOPIC MODELLING

- After running Topic Modelling (LDA) on our cleaned text data, we came up with 14 topics. These topics were analyzed to find relevant articles. Topic 5 had the most information to do with AI. Below is an excerpt from an article in Topic 5 which had a positive sentiment based on sentiment analysis done on the articles in this topic. This Article shows how Firemen and the Fire Department can employ AI techniques to detect fires early and help prevent Wildfires and does not impact the employment of any humans. The article talks about how AI is helping make the work easier for the humans.

TITLE - How AI technology could be ' a game changer ' in fighting wildfires

built by the Scripps Institute of Oceanography, the University of Nevada Reno and the University of Oregon. The cameras, powered by artificial intelligence, scan the horizon for puffs of smoke. When smoke appears on multiple cameras the system can triangulate the exact location of the fire. That precise location is then quickly paired up with localized weather data and real-time video from an aircraft dispatched to the scene. All this data allows a computer modeler to build a map that predicts the growth and direction of the fire. In, during the Tick fire in Southern California, the lab says it was able to predict that embers would cross a major highway in Santa Clarita and send fire to the other side. In response, the Los Angeles County Fire Department assigned resources to the other side of the highway to proactively put out the small fires caused by the embers before the fires grew larger. WIFIRE 's Firemap software was developed and tested in conjunction with major fire departments in Los Angeles, Ventura and Orange Counties and is available to departments across California for their initial attack on a fire. `` To know that this is exactly where the fire is right now and this is the direction that it's going is extremely valuable information, '' Cal Fire Battalion Chief David Krussow told CBS News Sacramento about the abilities of the mountain cameras. `` It truly a game changer. '' In addition to working on the problem of reaction time, the lab is also developing technology to keep prescribed fires, which are intentionally set to help clear debris from the forest, more predictable and under control. Nationally there is a movement to embrace more prescribed fire to better manage the risk of fire. However, there is a large backlog for setting those fires. In California, for example, the state wants to burn a million acres a year by but last year only 110,000 acres were burnt. The use of prescribed fire is also under major scrutiny after one got out of control last year and accidentally led to the largest wildfire in New Mexico history. Building on technology developed at the Los Alamos National Laboratory, Altintas and her colleagues are developing highly detailed mapping software that shows things like how much vegetation is in a forest, the height of the tree canopy, and how dry it is. `` Knowledge of what 's there and the local fire environment becomes very important, '' Altintas said. Using artificial intelligence, they can run a computer model that shows how a prescribed fire will behave in the actual environment before it's even set and, potentially, reduce the risk that a prescribed burn will get out of control . `` The wildland fire problem

SENTIMENT ANALYSIS

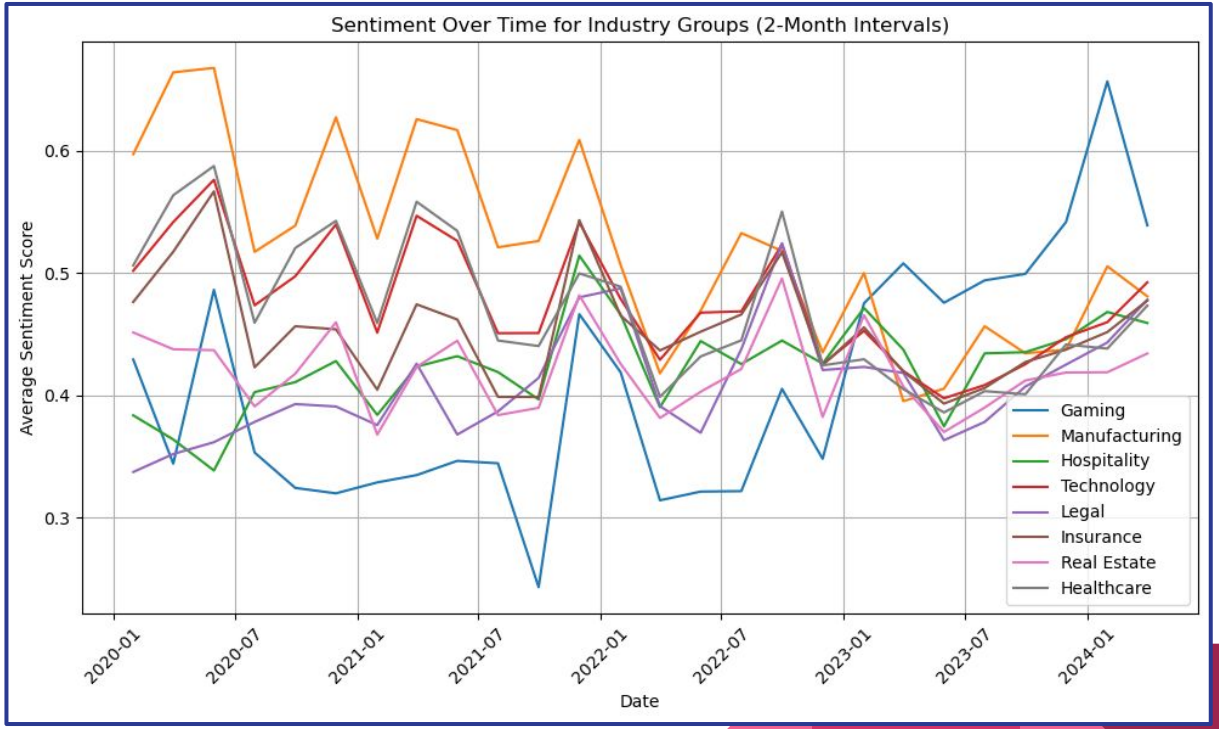
- Based on sentiment analysis, below were the Industries with sentiment scores closer to 1 indicate a more positive sentiment towards AI integration. This could imply that despite integration, people are not that worried about job security in these domains and are happy about the advancements of AI. Based on the generated sentiment scores, the following industries could be considered as top candidates for AI integration:
  - Gaming
  - Manufacturing
  - Hospitality
  - Technology

- Another interesting observation was that fields that usually are well knowing for AI integration had lower positive sentiments. This could be due to concerns about job displacement, ethical issues, and uncertainty about AI's impact on professional roles. Regulatory complexities and data sensitivity may also contribute to apprehensions. Addressing these concerns is essential for successful AI integration. The fields are as below:
  - Legal
  - Insurance
  - Real Estate
  - Healthcare

SENTIMENT ANALYSIS OVER TIME

- The Technology industry maintains high sentiment scores, trending positively from mid-2021 to 2024, reflecting successful AI integration and increasing public acceptance. Gaming has an upwards peak as well.

- Hospitality industry experiences a dip in sentiment in early 2021 which could be due to COVID-19 instead of challenges with AI adoption, but sentiment stabilizes afterward, suggesting successful integration or resolution of concerns. Real Estate has an overall low sentiment.



IDENTIFYING NEW TECHNOLOGIES & AI SOLUTIONS

- On running Named Entity Recognition over Products some off the well known and popular Generative AI products came up frequently within the articles. The products listed below are the most popular ones.


Open AI

Chat GPT


Google Deep Mind


Google Bard AI


Microsoft
Bing AI


Anthropic


Salesforce Einstein

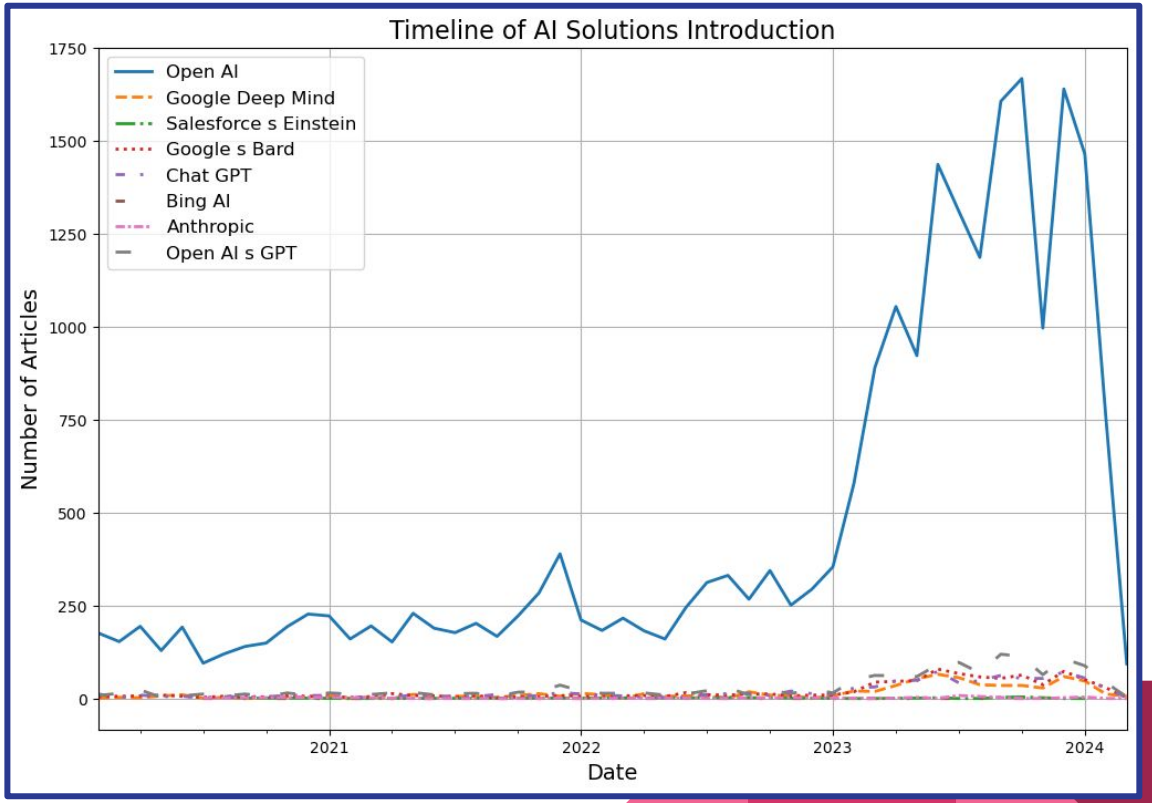
NEW AI TECHNOLOGIES OVER TIME

Consistent Presence of Open AI: We note a consistent presence of Open AI's mention over the years starting from 2020 because it was launched in 2015. All other solutions came up much later.

Open AI Surge in 2023/2024: A significant rise in articles suggests a major launch or event(launch of Chat GPT), potentially introducing new AI careers and automating tasks.

Steady Presence of Multiple AI Solutions Pre-2023: Other solutions were launched in 2023, causing lower or no media presence, creating roles in AI management and reducing automation-susceptible jobs.

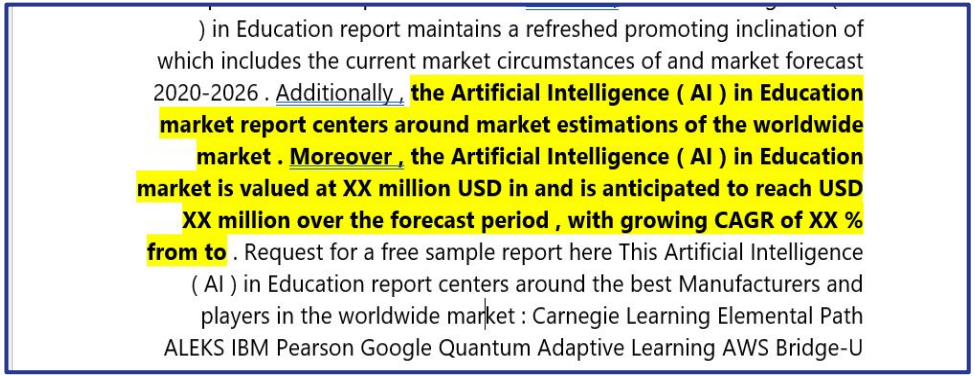
Low Media Attention to Other AI Solutions Post-2023: Solutions like Google's Bard show no similar increase, indicating a slower evolution with less immediate job impact.



IMPACT OF NEW TECHNOLOGIES IN ACADEMIC DOMAIN

This is the generated Summary for this Article along with excerpts from the actual article:

Summarize: Artificial Intelligence (AI) in Education Market Report, The worldwide artificial intelligence (AI) in Education market report is a basic view of information and strategies for the business administrators. The market is valued at XX million USD in and is anticipated to reach USD XX million over the forecast period, with growing CAGR of XX % from to.


) in Education report maintains a refreshed promoting inclination of which includes the current market circumstances of and market forecast 2020-2026 . Additionally , **the Artificial Intelligence (AI) in Education market report centers around market estimations of the worldwide market . Moreover , the Artificial Intelligence (AI) in Education market is valued at XX million USD in and is anticipated to reach USD XX million over the forecast period , with growing CAGR of XX % from to** . Request for a free sample report here This Artificial Intelligence (AI) in Education report centers around the best Manufacturers and players in the worldwide market : Carnegie Learning Elemental Path ALEKS IBM Pearson Google Quantum Adaptive Learning AWS Bridge-U

While AI technologies are generally embraced by some institutions for their potential to enhance learning experiences, concerns persist regarding the prevalence of cheating facilitated by AI, which undermines trust, integrity, and the credibility of academic credentials within educational institutions.

IMPACT OF NEW TECHNOLOGIES TO COMPANIES

This is the generated Summary for this Article along with excerpts from the actual article:

Summarize:Starting this month, some new personal computers that run Microsoft's Windows operating system will have a special Copilot key that launches the software giant's AI chatbot. The keyboard redesign will be Microsoft's biggest change to PC keyboards since it introduced a special Windows key in the 1990s. The newest AI button will be marked by the ribbon-like Copilot logo.

Microsoft's integration of a dedicated Copilot AI chatbot key into new Windows keyboards signifies a major push towards mainstreaming AI assistance in personal computing. It signifies commitment to integrating AI deeply into everyday computing experiences.

Microsoft 's new AI key is first big change to keyboards in decades –

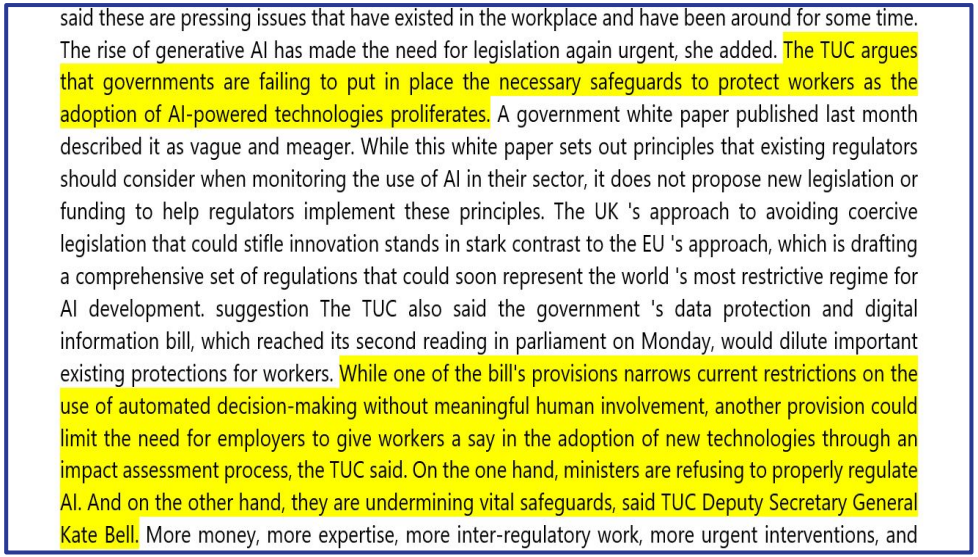
Computer keyboards are making room for an artificial intelligence chatbot button as Microsoft unveils its first major keyboard redesign in three decades. Starting this month, some new personal computers that run Microsoft 's Windows operating system will have a special `` Copilot key '' that launches the software giant 's AI chatbot. Getting third-party computer manufacturers to add an AI button to laptops is the latest move by Microsoft to capitalize on its close partnership with Chat GPT-maker Open AI and make itself a gateway for applications of generative AI technology. Although most people now connect to the internet -- and many AI applications -- by phone rather than computer, it's a symbolic kickoff to what 's expected to be a competitive year as tech companies race

IMPACT OF NEW TECHNOLOGY IN THE GOVERNMENT SECTOR

This is the generated Summary for this Article along with excerpts from the actual article:

Summary: Britain's Trade Union Congress warned on Tuesday that it is failing to protect workers from the rapid adoption of artificial intelligence systems. The rapid development of generative AI systems such as Chat GPT has raised concerns about the potential impact of new technologies in the workplace. But the TUC said AI-powered technologies are already widely used across the economy to make life-changing decisions. The TUC also said the government's data protection and digital information bill would dilute existing protections for workers.

Despite AI's widespread adoption, TUC concerns highlight ongoing challenges in safeguarding workers' rights. The rapid development of AI, including Chat GPT, raises questions about employment dynamics. Criticisms of government legislation underscore the need for robust safeguards.

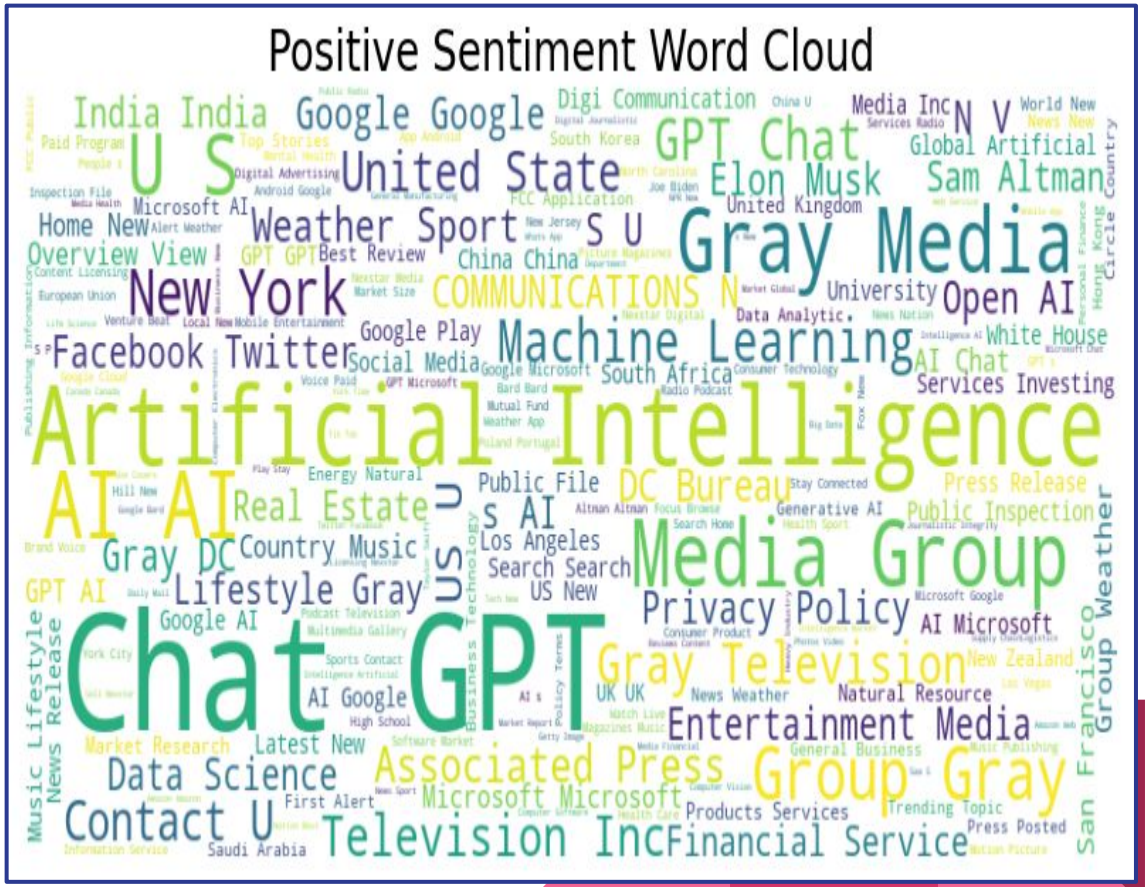


said these are pressing issues that have existed in the workplace and have been around for some time. The rise of generative AI has made the need for legislation again urgent, she added. The TUC argues that governments are failing to put in place the necessary safeguards to protect workers as the adoption of AI-powered technologies proliferates. A government white paper published last month described it as vague and meager. While this white paper sets out principles that existing regulators should consider when monitoring the use of AI in their sector, it does not propose new legislation or funding to help regulators implement these principles. The UK 's approach to avoiding coercive legislation that could stifle innovation stands in stark contrast to the EU 's approach, which is drafting a comprehensive set of regulations that could soon represent the world 's most restrictive regime for AI development. suggestion The TUC also said the government 's data protection and digital information bill, which reached its second reading in parliament on Monday, would dilute important existing protections for workers. While one of the bill's provisions narrows current restrictions on the use of automated decision-making without meaningful human involvement, another provision could limit the need for employers to give workers a say in the adoption of new technologies through an impact assessment process, the TUC said. On the one hand, ministers are refusing to properly regulate AI. And on the other hand, they are undermining vital safeguards, said TUC Deputy Secretary General Kate Bell. More money, more expertise, more inter-regulatory work, more urgent interventions, and

SUCCESS STORIES

THESE ARE SOME SUCCESS STORIES

- Technology and social media giants like Google, Microsoft, Facebook, and Twitter invest in AI and machine learning to enhance services, target ads, and moderate content, aiming to improve user experience and develop new products.
- Media and communications firms integrate AI to personalize content, optimize distribution, and automate reporting, staying competitive by offering relevant content and understanding audience preferences through data analytics.
- People have a positive sentiment about Sam Altman the CEO of Open AI probably for his work with Chat GPT.

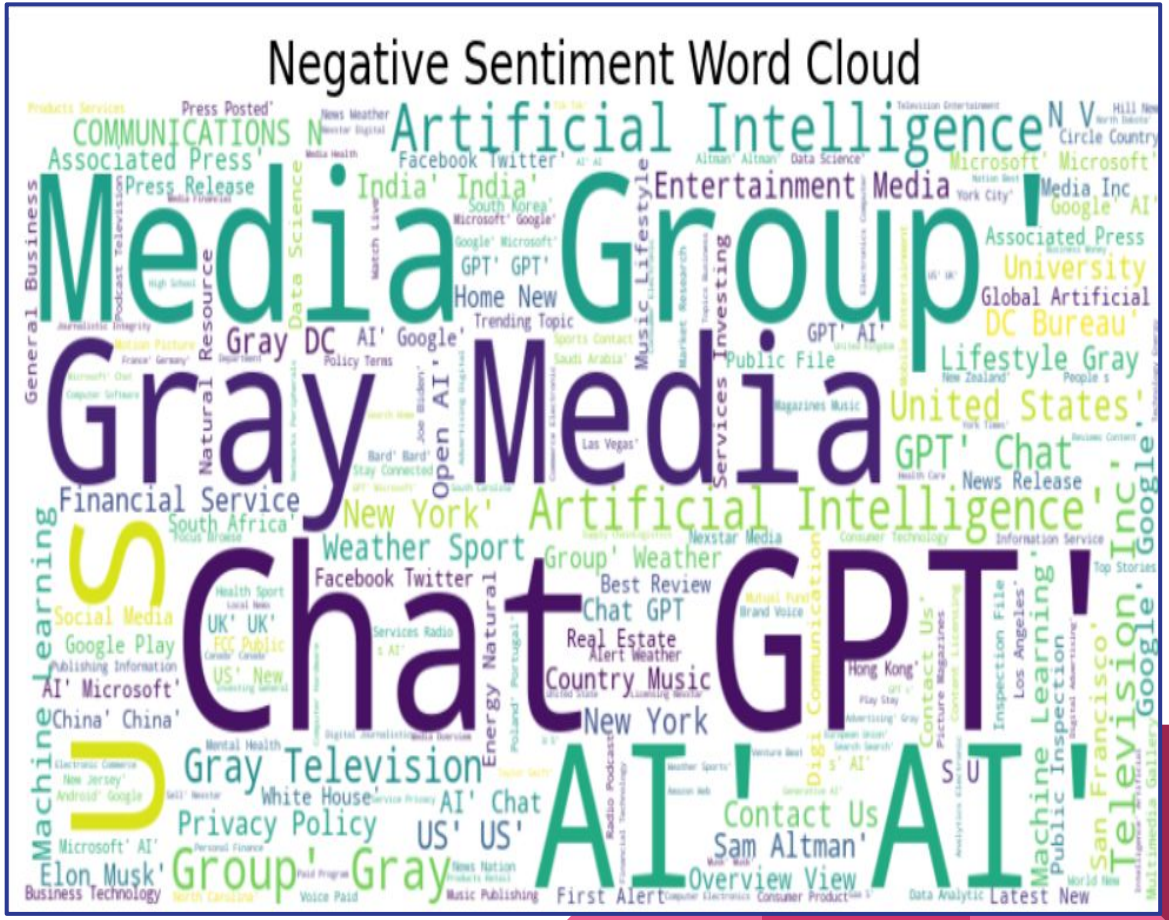


FAILURES OF AI

The word cloud suggests concerns around "Privacy Policy," "GPT," "AI," and "Media Group," indicating areas where AI may face challenges.

- Privacy and Ethics: AI encounters challenges navigating complex privacy and ethical issues independently due to diverse international standards and the intricate nature of human values, necessitating human oversight.

- Creative Industries: AI aids but cannot supplant human creativity in domains like entertainment, art, music and specific facets of media, where emotional depth, cultural context, and originality hold utmost importance.



STRATEGIC AI IMPLEMENTATION: ACTIONABLE INSIGHTS

- We can evaluate industry-specific AI implications and tailor strategies accordingly.
- We can identify tasks suitable for automation and provide employees with the requisite skills for adapting to evolving roles. This approach ensures that AI enhances human efficiency rather than replacing human workers.
- We can establish transparent guidelines for ethical AI deployment and advocate for regulatory clarity to ensure responsible AI use. This approach will promote responsible AI use and ensure ethical deployment, fostering trust and transparency in AI technologies.
- By staying updated on AI advancements and cultivating organizational readiness, businesses can seamlessly integrate AI solutions, driving innovation and enhancing operational efficiency.
- Gaining insights from successful AI implementations enables organizations to enhance efficiency and foster innovation. By investing in research and development for emerging AI technologies, businesses can prepare themselves for future industry shifts and remain competitive.
- Embracing a holistic approach to AI adoption, including tailored strategies, ethical deployment, organizational readiness, and continuous learning, ensures enhanced efficiency, innovation, and future competitiveness, all while recognizing that AI will augment human capabilities rather than replace them in the foreseeable future.

CONCLUSION

- AI signifies a shift towards enhancing productivity and innovation, rather than displacing the workforce.
- Tailored AI integration and workforce upskilling are key to leveraging AI for efficiency and innovation.
- Ethical AI deployment is crucial for addressing potential societal impacts and ethical dilemmas.
- Technology, healthcare, and gaming sectors are at the forefront of experiencing significant AI transformations.
- AI's advancement could lead to the automation of specific job roles such as **paralegals** in the legal domain, **data entry clerks** in various industries, **sales representatives** because AI is better at targeted marketing and **customer service representatives**, enhancing efficiency but also necessitating workforce adaptation and upskilling.
- The implementation of AI in various sectors highlights the importance of synergy between human skills and algorithmic precision.

APPENDIX I - Drive link for the Entire Project

The Project notebooks and data can be accessed using this drive link -

NLP Final Project Arushi Makraria