

Impact of Artificial Intelligence in Careers

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EXECUTIVE SUMMARY

Research Objective: Analyze news articles to determine which industries and job types will experience the most significant impacts due to AI adoption and automation.

Key Insights

- Industries Positively Impacted by AI and Opportunities for Growth:
 - Healthcare, Drug Discovery, Agriculture, Climate/Energy, Finance, Retail, Insurance, Travel, Customer Relationship Management
- Industries Facing Challenges due to ethics and adoption barriers:
 - Facial Recognition Applications, Autonomous Vehicles

Actionable Recommendations

- **Businesses:** Invest strategically in AI to streamline repetitive, high-volume tasks while transparently addressing ethical/privacy concerns.
- **Governments:** Proactively develop clear AI regulation frameworks, addressing privacy and ethical challenges.
- **Academic Institutions:** Prioritize workforce retraining initiatives, emphasizing AI literacy and new skill development aligned with emerging technology.

Preprocessing the data for NLP tasks

Data Overview: Consisted of about ~200k articles with titles and text extracted from the web

Preprocessing

- Cleaned text by removing non-English characters, irrelevant words and other remnants of web crawls such as new line and tabs using **Regex**
- Casing and punctuation was kept for **Name Entity Recognition (NER)** and **Sentiment Analysis**
- For **topic modeling**, further normalized text by removing all punctuation and lowercasing
- Finally articles with no related text to artificial intelligence were removed from dataset

NLP Tasks & Process Utilized

Topic Modeling

- Removed all stopwords, first using **NLTK** package and then adding custom stopwords upon further analysis
- **BERTopic** initially identified 131 topics
 - Then used HDBSCAN to automatically reduce topic number to 91
 - Further analysis found only 19 topics to be relevant to AI in jobs

NER

- Applied **SpaCy** large model to discover products, organizations, people, and other entities involved in the AI world

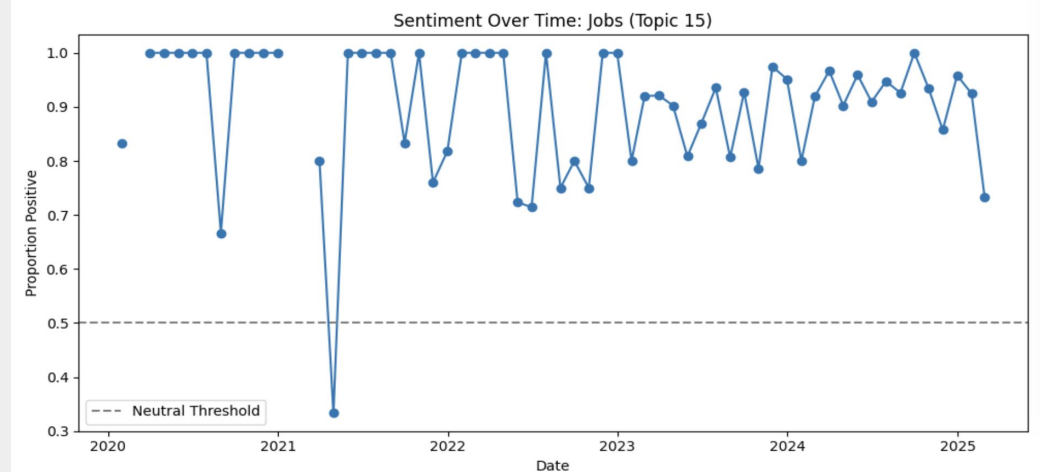
Sentiment Analysis

- Model used is a fine-tuned RoBERTa model¹ called SiEBERT (or Sentiment in English)
- Returns binary sentiment analysis

¹ Hartmann, J., Heitmann, M., Siebert, C., & Schamp, C. (2023). More than a feeling: Accuracy and application of sentiment analysis. *International Journal of Research in Marketing*, 40(1), 75–87.
<https://doi.org/10.1016/j.ijresmar.2022.05.005>

A First Look at Topics Discovered in text

- Among the 91 topics related to artificial intelligence, only about 20 were industries
 - However, one topic that was not an industry but still relevant was one regarding jobs.
- Y-axis the the proportion of articles that were positive in this topic over time
- Initial introduction of artificial intelligence shows negative sentiment
- However as new tools seemed to support rather than supplement, sentiment appears to improve from 2022 to 2024
- The sudden drop in 2025 is likely due to the reports of AI replacing full time jobs this year



Top Candidates for AI Integration

Healthcare

AI excels at recognizing patterns in images, thus being a possible solution for medical imaging and diagnostics.

AI automation could also manage data entry of patient charts and other paperwork

Drug Discovery

Analysis of molecules and model simulations could assist in trials and predictions of success

Agriculture

Monitoring of crops, fertilization can help directly with farms.

Yield prediction can support farmers in decisions and resource optimization

Travel/Hospitality

Rising use of AI in Customer Relationship Management (CRM) as well as managing all of the varying factors that go into travel. Whether the industry is airlines, hotels, or travel, AI has potential impact to manage many tasks

Security/Fraud

Surveillance detection through computer vision can automate threat identification, facial recognition in real time.

Also applicable in cybersecurity which can analyze similar to fraud detection.

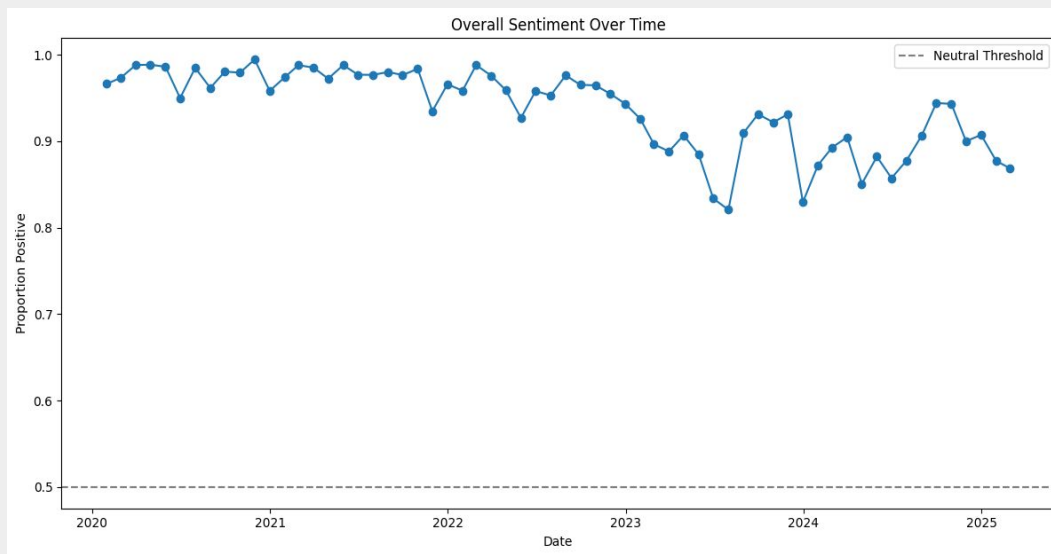
Design/Imaging

Generative AI can instantly produce high-quality images, thus reducing manual creative tasks.

Also can automate wireframing and prototyping usually involved in UI/UX

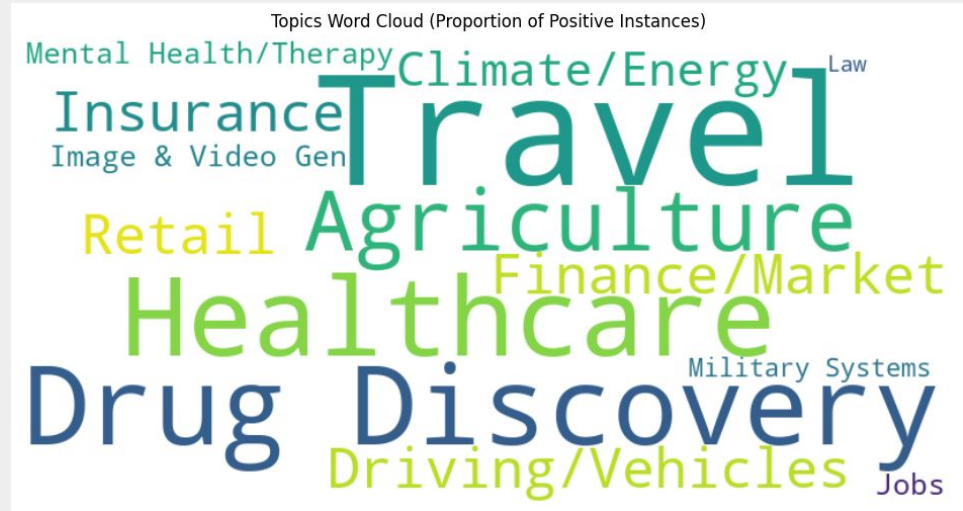
Understanding Sentiment Trends: Overall Sentiment

- Observed that prior to 2022, AI sentiment was relatively stable
- A noticeable gradual decline in sentiment occurred throughout 2022 to mid 2023
- Before 2022, AI was not as popularized and less exposed to the public and to controversy
- The decline of overall sentiment was of particular note, especially given its alignment with the introduction of some technologies and companies



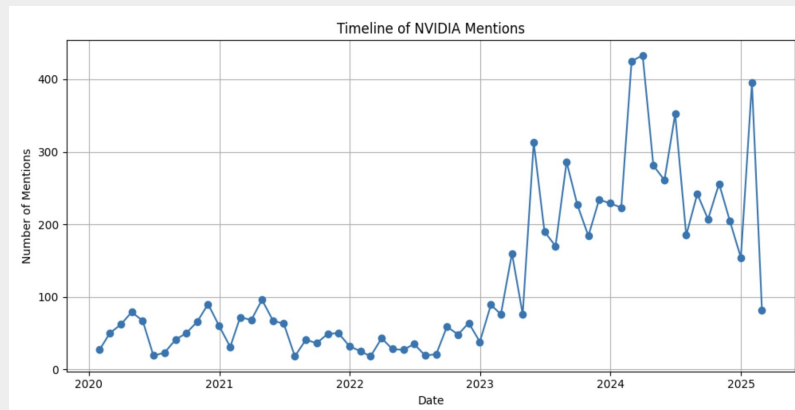
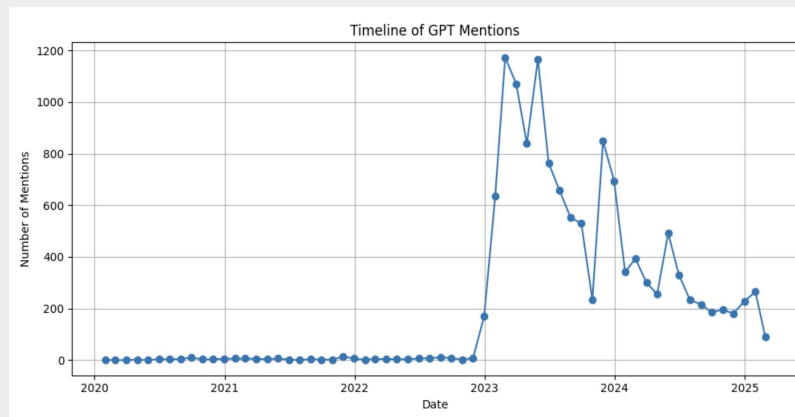
Industries with Highest Positive Proportion AI Sentiment in Articles

- **Healthcare (98%)** - Diagnostics and personalized solutions could improve hospital operations and patient outcomes
- **Travel (98%)** - Management and optimization of travel plans
- **Drug Discovery (97%)** - AI could significantly accelerate drug developments
- **Agriculture (97%)** - Crop monitoring and analytics



Understanding Sentiment Trends: Introduction of Emerging Technologies

- Major AI technologies such as ChatGPT, CRM, and NVIDIA's advanced GPUs emerged prominently around the late 2022 to early 2023. We can see their sudden rise in article mentions
 - This dramatic increase in media coverage was both optimistic and cautionary
 - It also spread into wider societal impacts including pop culture, education, and jobs
- This could explain the slight decrease in sentiment since 2023 as well as the volatility in the sentiment

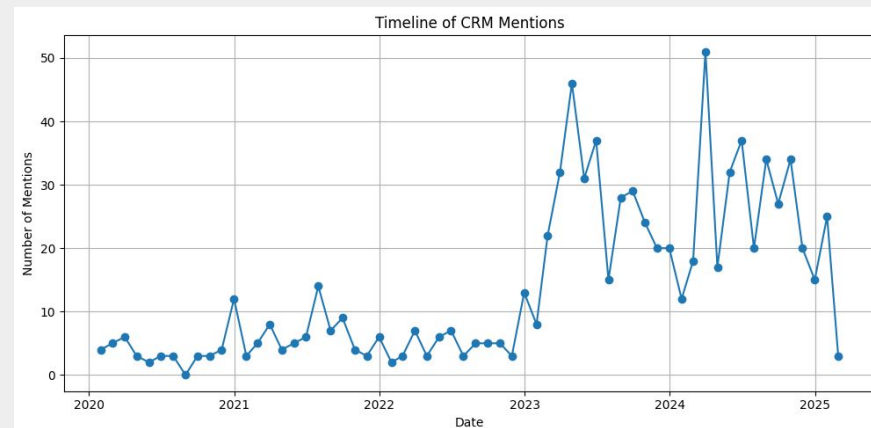
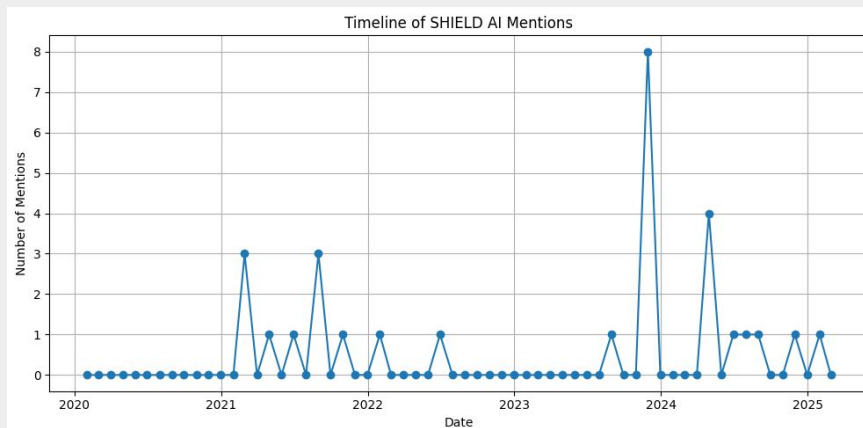
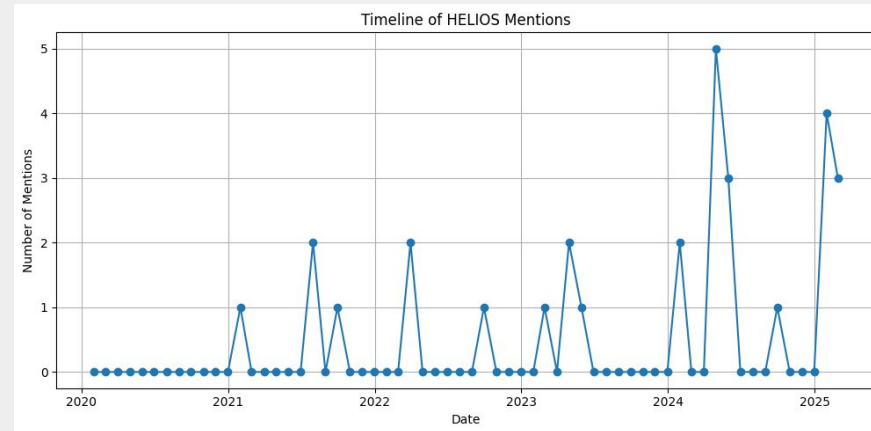


Emerging Technologies

- **AI Travel planners** can help user plan and manage their trip. Used by companies such as Booking.com and Expedia
- Stable Diffusion (or Stability AI) is a **text-to-image generative AI model** that can produce unique and photorealistic images
- **Shield AI** develops artificial intelligence systems for defense applications, specifically autonomous drones to reduce risks to military personnel
- **Helios** is an **AI-powered workforce management platform** that provides global payroll, payments, and other human resource solutions.
 - Beneficial for scaling business internationally as it automates regulatory compliance and reduces administrative tasks
- Emerging **CRM** technology shows a possible take over in sales and customer service

Emerging Technologies: Plotting mentions in articles over time

- Spiking news in the beginning of 2024 show technology starting to break news with stories of investments or use
- Note the scale of CRM is much bigger than that of Helios and Shield AI due to it being a broader topic rather than a single company



Players in the AI World

Companies such as Microsoft, Google, NVIDIA are developing and investing more money into AI to enhance or build new products of their own.

Investors such as AWS and Virtus Investment seek upcoming technologies that could impact the world with new AI applications

- Providing both financial and platform support smaller companies can utilize resources to build and improve their products

Government bodies such as the FCC, White House, FDA, and International government continue to monitor and alert the public when AI poses a threat to security and human rights

Future Investing in AI

Travel | Booking.com, Expedia

- AI-powered chatbots, personalized marketing, automated pricing tools to improve operational efficiency and customer experience

Security & Fraud Prevention | ShieldAI, Guardforce

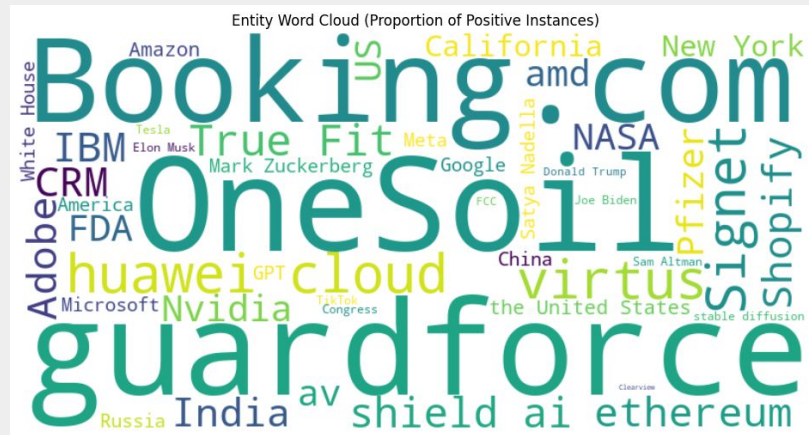
- Security and surveillance through real time anomaly detection and analytics

Agriculture Tech | OneSoil (with NASA)

- Optimizing farming efficiency and predictive agriculture analytics

Retail | True Fit, Shopify

- Personalized shopping experience for users



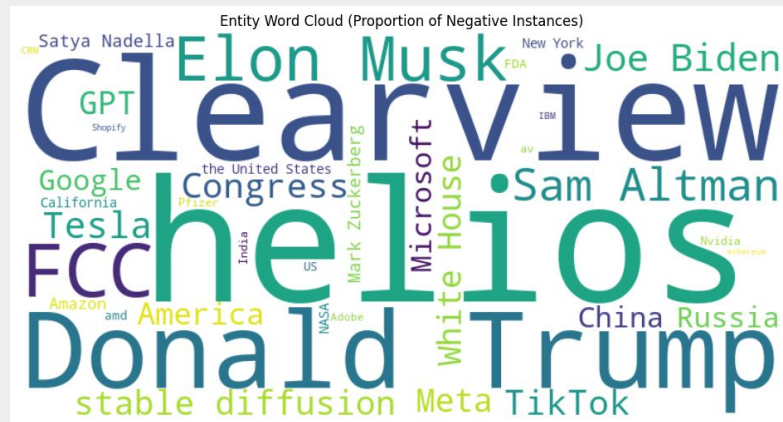
Areas Not as Ready for AI Applications

Facial Recognition Technology | Clearview AI

- Controversies on ethical and privacy violations
- Possible misuse of data

Autonomous Vehicles | Tesla, Elon Musk

- Safety concerns and reliance on vehicles
- Still regulatory hurdles that have slowed adoption



Generative AI related to Name Image and Likeness | Stable Diffusion, TikTok

- Ethical and copyright concerns such as deepfakes and unauthorized content use
- Additionally fear of misinformation and misuse across media and other social media platforms

Government Entitles | Donald Trump, FCC, Congress, Joe Biden

- These names likely appear due to the regulations that are put in place after a negative instance of AI technology. There also may be negative sentiment due to any frustration that the government may cause due to slow responses despite the rapid growth of AI

Conclusion: The Future of AI Involvement in Jobs

AI can be a double edged sword

- AI technologies can bring significant opportunities, but although some entities may have positive sentiment in some articles, doesn't necessarily mean they weren't also negative opinions. In fact, some of the big entities with the most positive mentions also were the ones with the most negative mentions

Future Work

- The technologies found in these articles weren't necessarily replacing jobs, but rather helping to improve the jobs that already exist. To allow for humans to focus on less monotonous tasks, or find deeper and richer insights.
- Hopefully the path of AI doesn't eliminate jobs outright like some may believe but rather allow for us to take the next step in discovering something new