



HOW IS AI TRANSFORMING THE MARKET

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EXECUTIVE SUMMARY

- Insights are extracted from 199K+ news articles, shedding light on how AI is influencing the market
- **Sentiments** regarding AI are generally positive. As AI's presence surged considerably in the last year, there is a slight drop in sentiments
- AI is shaking up the **employment landscape**, presenting both challenges and opportunities:
 - AI technologies like Generative AI are replacing process works, as many companies found them to be cost-saving and efficient
 - With the increasing need for advanced AI tools, the demand for skilled AI experts has been boosted
 - Despite the recent introduction of AI technologies like Generative AI and Large Language Models, they are widely discussed and utilized
- Efforts can be made to ensure the speed and healthy **development of AI technology**, including attracting both human and financial capital, maintaining the competitiveness of the market, and coming up with appropriate regulations to address ethical concerns.
- A variety of industries are positively correlated with both **AI and investment**, showing positive signals for companies that aspire to deploy AI technology to facilitate business growth
- However, current AI technologies still face **limitations**, including in jobs requiring manual operation or specialized skills, inability to replace human interactions, and being susceptible to societal biases
- **Recommendations** include that companies should incorporate AI technologies to develop their business and attract investment. Meanwhile, future efforts should be directed to interdisciplinary cooperation to advance AI's skills and role in human life as well as to establish a legal basis for responsible development.

METHODOLOGY AND DATA OVERVIEW

Data Overview:

199600+ articles from four years, with the majority from 2023
covering 10 main topics*, with 'AI', 'Data', 'news', 'new', 'market' as most salient tokens

Methodology:

Pre-processing:

- Truncate the content part of the article, cleaning headers and footers from web scraping; tailored algorithm to extract content from frequent source companies (eg. PR Newswire)
- Tokenize content and title: remove numbers, punctuation, website, and stop words and conduct lemmatization
- Remove extremely long n-grams that might be web scraping remains
- Conduct topic modeling and remove articles closely related (> 85%) to 2 irrelevant topics

Sentiment Analysis & NER

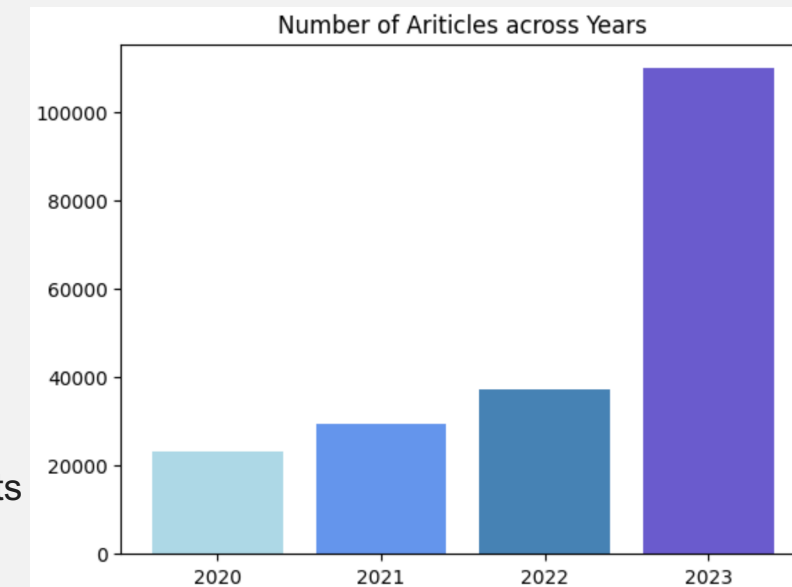
- Customize models based on financial news sentiments
- Implement sentence-level sentiment analysis with the best model, and use NER in spacy to identify relevant organizations (ORG) and technology (Work of art, product) mentioned in the sentence.
- Calculate the general sentiment of each article

Targeted Dataset

- Filter relevant articles based on tokens of title and sentiment analysis score
- Adopt DistilRoBERTa model to classify the main industry discussed in the article
- Conduct text summarization to extract insight from articles

Presenting Insights

- Cite quotes from articles to demonstrate insight statement
- Aggregate tokens in article and data cross years, plotting graphs show tendency and weights



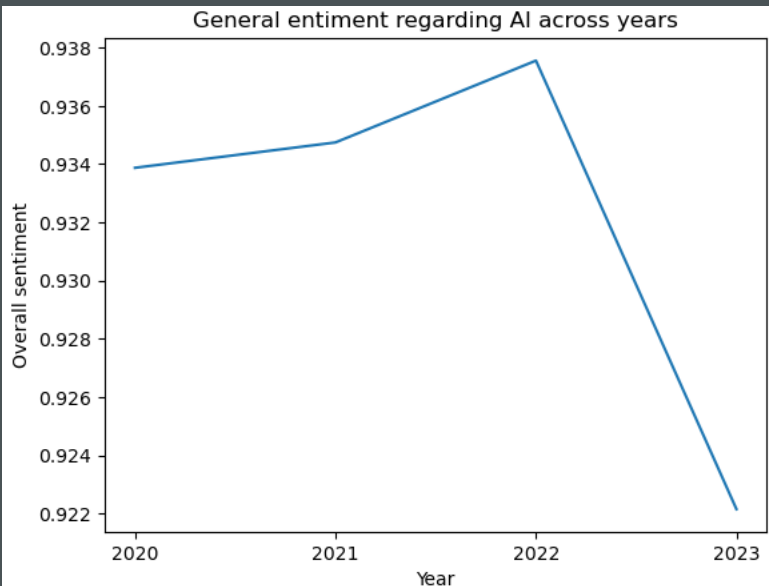
*See technical support slide for more information

GENERAL PICTURE

Relevant dataset size: 190k+

Model and Tools used:

Experimented sentiment analysis model based on logistic regression, SVM, and BERT trained on [financial news sentiment dataset](#). Adopted logistic for accuracy and speed (85.3% accuracy)*



Overall Sentiment regarding AI

On a scale of 0 to 1, the general sentiments regarding the topic of AI is positive. We can observe gradual increase from 2020 to 2022, but a sudden drop from 2022 to 2023. Then sentiment analysis score is used to filter positive and negative impact of AI

Jobs susceptible to development of AI technology

Threat: AI automation are cheaper and more efficient in some simple tasks

a higher proportion of tasks that are exposed to automation and replacement by AI include the legal field along with office and administrative support [...] The types of tasks that are automatable tend to be those that can be performed by chatbots or transcription tool.

-- These jobs are safe from the AI revolution — for now

"banks continually look to utilise robotics to replace workers and cut costs [...] US study shows Wall street's top firms have already begun to use machine learning and cloud computing technologies to automate many processes, eliminating the need for workers"

-- 30% of banking jobs to be lost to AI within five years – Vikram Pandit

Opportunity: increasing demand to deploy AI technology drives the need for AI experts

Banks are hungry for experts in artificial intelligence, helping to make New York a top market for employment in the emerging field.

-- Hiring spree at banks gives New York leg up in race for AI jobs

As AI becomes increasingly popular in Silicon Valley this year, tech giants like Netflix and Amazon are eager to hire AI experts for positions [...] people skilled in AI can land offers of up to \$900,000, which translates to over Rs 7 crore per annum.

-- Netflix, Amazon Target AI Experts; Jobs Offered With Rs 7 Crore Package

* See technical support slides for more information

AI TECHNOLOGIES
AND SOLUTIONS
THAT RESHAPES THE
EMPLOYMENT
LANDSCAPE

Relevant dataset size: 2k+ for job related
Models and Tools used: Keyword approach to find relevant articles; Spacy NER on sentence level to find technology

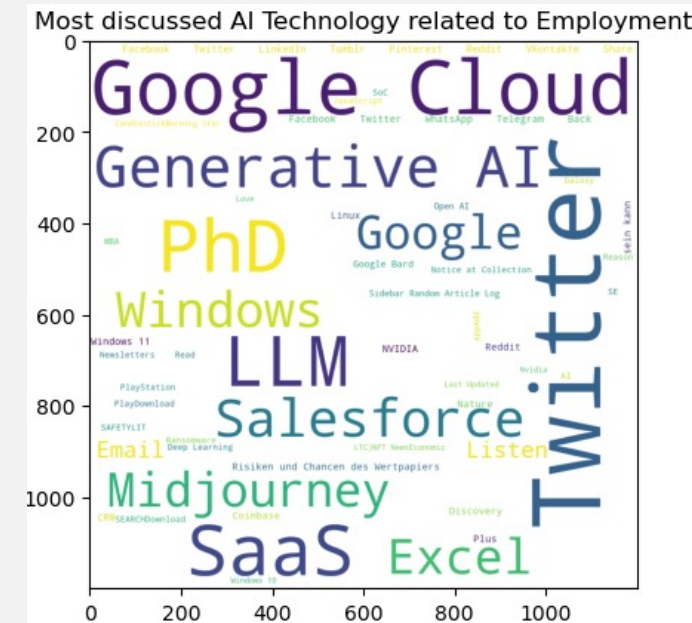
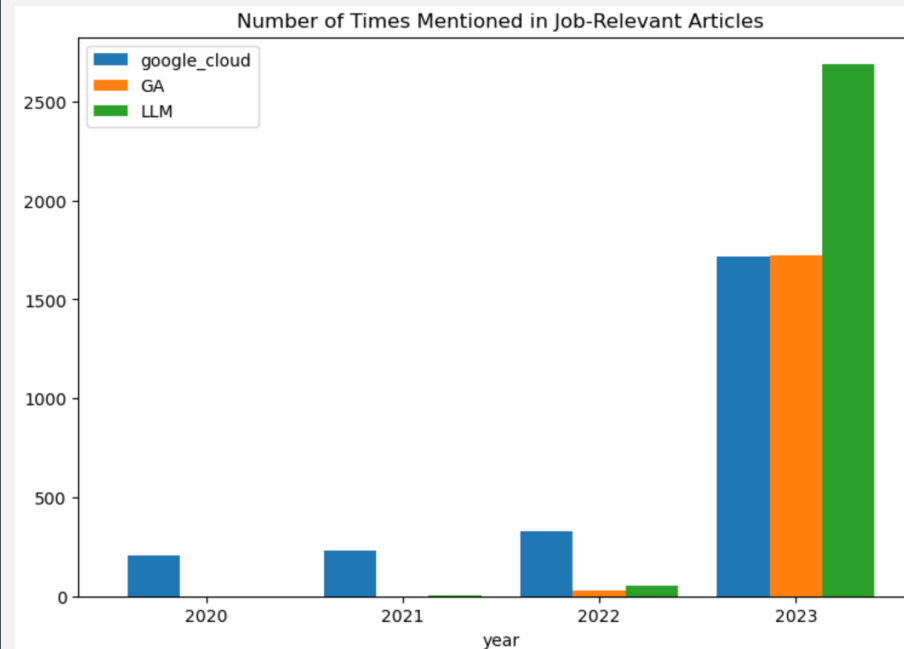
Models and Tools used: Keyword approach to find relevant articles; Spacy NER on sentence level to find technology

Most Discussed Technology

In news articles that focus on AI's influence on the employment landscape, I used spacy NER to identify AI technology and extracted the most frequent ones

Discussion timeline

Counted number of times three representative (Google Cloud, Generative AI, and Large Language Models) technologies are mentioned across years



Insight

Discussion regarding these technologies skyrocketed from 2022 to 2023. Even though both LLM and Generative AI only become a part of the conversation since 2022, they are showing a significant presence across the news now.

ACCELERATING AI DEVELOPMENT

Relevant dataset size: 3k+

Model and Tools used: Keyword approach to find relevant articles; Summarization with Sumy; Spacy NER to identify organizations

What can be done to accelerate transformative AI development

Based on articles that discuss AI development, I used summarizers to extract the key insights.

Keeping the competitiveness and innovation of AI product market

"ensure the development and use of foundation models evolves in a way that promotes competition and protects consumers [...] This competition and innovation, in turn, could boost the overall economy, fostering increased productivity and economic growth"

Attracting AI Experts (human capital) to integrate AI solutions

In every industry, the race is on to deploy AI to improve competitiveness, yet many companies don't have the technical teams and resources needed to develop, test, and deploy cutting-edge AI solutions

Leveraging financial investment for technical development

[...] financial support will enable the company to accelerate its research and development efforts, further optimize software systems, and expand its operations to meet the growing demand for clean, efficient, and cost-effective energy solutions

Raising awareness of the bias and ethics problems regarding AI

You can't have a serious discussion about the "ethics" of any technological solution without examining the biases of its human creators and structural inequities that influence the design as well as output of these systems

PROSPECT OF INVESTMENT

Relevant dataset size: 7k+

Model and Tools used: spacy NER, DistilRoBERTa [model](#) to classify the industries, sentiment analysis

Companies showing positive sentiments regarding investment



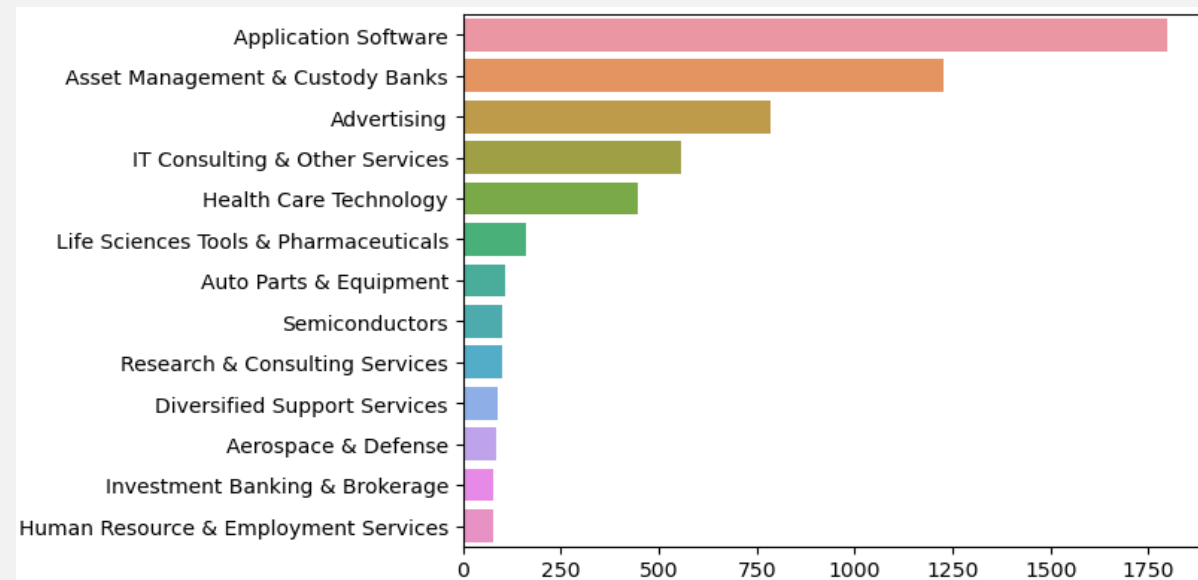
Companies associated positively with investment

I have explored companies and industries positively associated with investment in recent news

- While top companies in Application Software (Amazon, Microsoft, Google) are the most likely to both receive capital and invest in AI technologies, there are also investments from funds and government-related organizations
- Along with IT, banking, advertising, and healthcare industries are the industries most positively connected with investment in AI tech.

Recommendations

- Companies should deploy AI technology in business and attract investments, then use these capital to further leverage efficiency brought by AI



LIMITATION OF AI TECHNOLOGY

Relevant dataset size: 190k+

Model and Tools used: Keyword approach to find relevant articles; Sentiment Analysis

Limitations

Despite the influence AI technologies have in many indifferent industries and sphere of life, there are still some limitations

Conducting work that requires manual and outdoor work or specialized knowledge

-- These jobs are safe from the AI revolution — for now

Generative AI and chatbots cannot fully replace human connection despite they can be trained for therapy purpose

-- For Some Autistic People, ChatGPT Is a Lifeline

AI tools are susceptible to sociological bias thus imposing harm to the equality of society

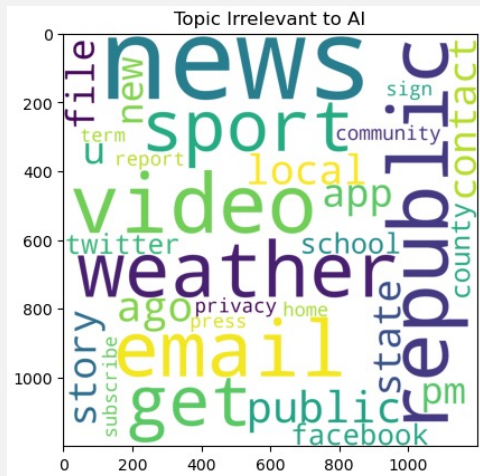
-- What We Learned Auditing Sophisticated AI for Bias

Recommendations

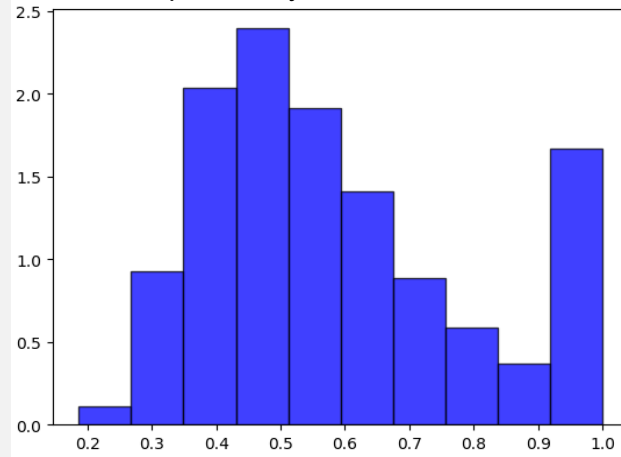
- Raising awareness regarding [ethical concerns](#) and [bias](#) in AI tools and constructing the [legal basis](#) for the development of AI
- Increasing [the interdisciplinary cooperation](#) between experts in AI and specific fields (like medical) to design AI tools with specialization
- Recognizing the importance of [human interaction](#) and potentially using AI tools to deepen human connection

TECHNICAL SUPPORT SLIDE

- Topic Modelling
 - Picked 10 topics based on the coherence score and distribution of topics – whether articles within the same topic is coherent and whether it is able to separate articles not related to AI
 - For articles on topics irrelevant to AI, only the highly related ones (85%) are removed.
- Sentiment Analysis
 - Customized sentiment analysis model with financial news dataset to have higher accuracy
 - Experimented with different models and fine-tuned count vectorizer, n-gram range, max_df and min_df. While the BERT model is more accurate than logistics, it takes a lot longer to run.



Distribution of probability for articles in irrelevant topics





THANK YOU!