From Physics to Industry

Statistics, Trends, and Perspectives on Physics in Industry

Dylan Frizzell PhD

Outline

Types of Jobs and Industries
- **Job types, sectors, and salaries**

Progressing your career
- **Soft Skills, business acumen**

Getting the first job
- **Skills, Resources, Expectations**

My Lesson's Learned

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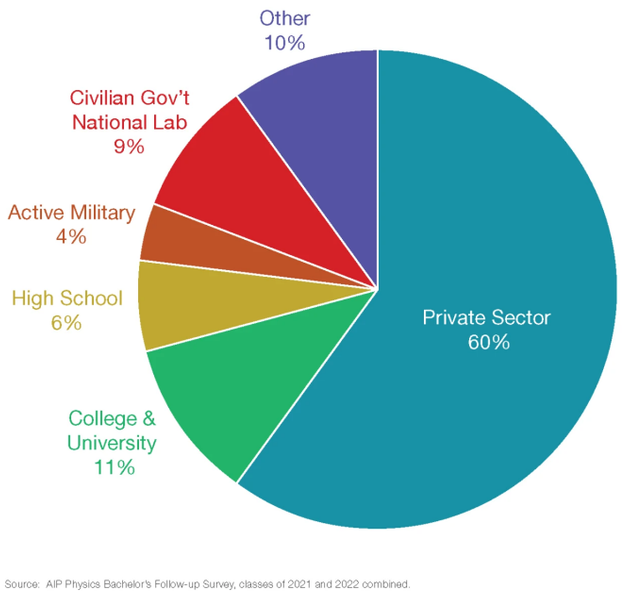
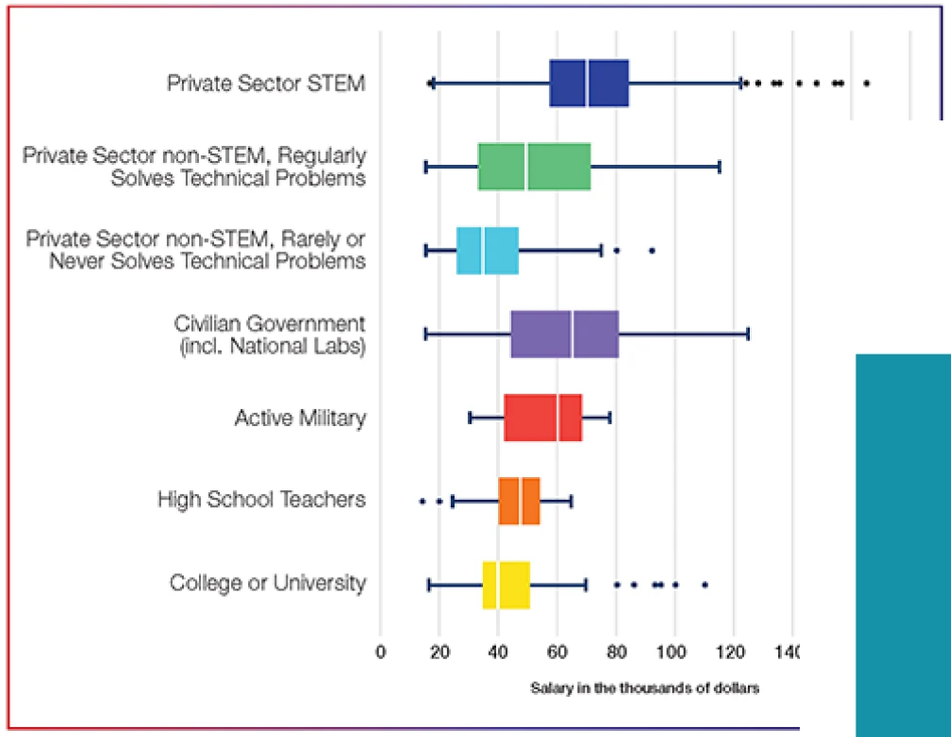
Physics to Industry

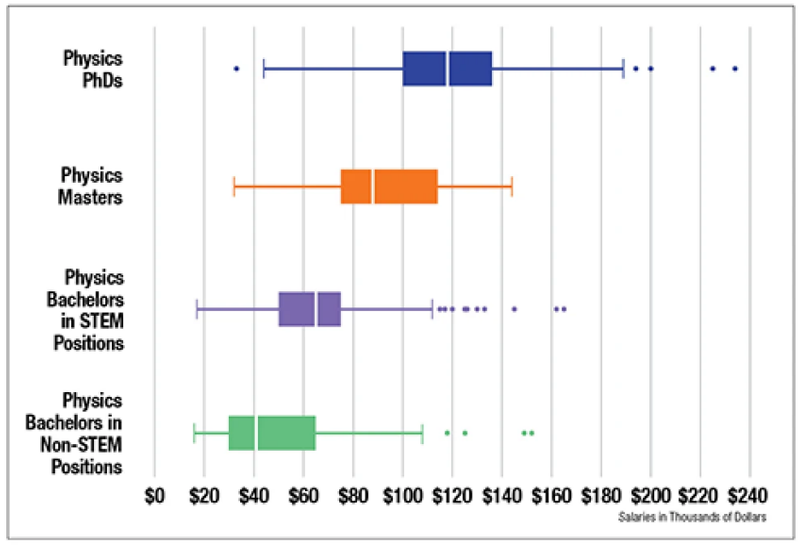
Where New Physics Bachelors Work



Source: AIP Physics Bachelor's Follow-up Survey, classes of 2021 and 2022 combined.

Starting Salaries for Physics Bachelors





Common Job Titles for New Physics Bachelors

Engineering
- Systems Engineer
- Engineering Technician
- Electrical Engineer
- Project Engineer
- Mechanical Engineer
- Test Engineer
- Process Engineer
- Production Engineer
- Design Engineer
- Manufacturing Engineer
- Application Engineer
- Data Engineer
- Scientist

Research and Technical
- Research Assistant
- Researcher
- Research Technician
- Junior Specialist
- Patent Examiner
- Accelerator Operator
- Physicist
- Scientist

Programming/Software
- Software Engineer
- Software Developer
- Application Developer
- Data Engineer
- Data Analyst
- Data Scientist
- Machine Learning Engineer
- Consultant

Education
- High School Physics Teacher
- High School Math Teacher
- Middle School Science Teacher
- Tutor

Finance/Business
- Data Analyst
- Research Analyst
- Project Manager
- Investment Banker

Source: AIP Physics Bachelor's Follow-up Survey, classes of 2021 and 2022 combined.

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Physics to Industry

What makes Physics so beautiful, is when you understand nature you can understand anything.

The hardest part will be choosing your journey.

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Physics to Industry

Who's hiring physics Bachelors
- https://ww2.aip.org/statistics/whos-hiring-physics-bachelors

Who's hiring physics PhDs
- https://ww2.aip.org/statistics/whos-hiring-physics-phds

Common Themes in Private Sector:
- Medical physics
- Microchip and electronics engineering
- System/Process/Project Engineer
- Data Science/Analytics
- Software
- Instructors

Top skills:
- Technical Writing - technical communication in general
- Programming
- Critical Thinking / Sanity Checking / **First Principles Thinking**

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Software Eng/Data Science Salary Progression

Base Salaries by Degree Level for Data Science Individual Contributors

Job Level	Education	Base Salary			
		25%	Median	Mean	75%
IC-1	Bachelor's	$75,300	$88,300	$93,693	$110,000
	Master's	$80,200	$100,000	$100,883	$120,000
	PhD	$100,000	$119,000	$121,623	$137,600
IC-2	Bachelor's	$95,150	$110,200	$115,176	$130,200
	Master's	$106,650	$130,000	$127,637	$150,000
	PhD	$122,500	$150,000	$144,755	$170,000
IC-3	Bachelor's	$120,000	$150,000	$150,205	$170,000
	Master's	$130,000	$158,000	$156,078	$180,000
	PhD	$133,600	$160,000	$159,357	$180,050

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Job Level	Region	Base Salary			
		25%	Median	Mean	75%
IC-1	Midwest	$75,300	$85,300	$90,343	$100,000
	Mountain	$95,000	$105,000	$110,195	$123,750
	Northeast	$83,500	$105,000	$106,050	$130,000
	Southeast	$80,000	$90,000	$92,877	$105,300
	West Coast	$100,000	$110,100	$115,431	$130,000
IC-2	Midwest	$90,000	$108,000	$114,231	$135,300
	Mountain	$110,000	$130,000	$128,308	$150,000
	Northeast	$110,150	$130,200	$131,374	$150,000
	Southeast	$95,225	$117,650	$120,133	$146,475
	West Coast	$107,750	$130,000	$129,726	$140,000
IC-3	Midwest	$110,300	$140,000	$139,568	$160,000
	Mountain	$125,150	$150,000	$145,593	$165,100
	Northeast	$137,300	$160,200	$161,502	$180,000
	Southeast	$140,000	$145,100	$152,918	$175,000
	West Coast	$150,000	$175,000	$171,705	$200,000

Job Level	Industry*	Base Salary			
		25%	Median	Mean	75%
IC-1	Advertising/Marketing	$72,650	$80,000	$84,878	$95,000
	Consulting	$80,250	$100,000	$102,718	$120,050
	Financial Services	$85,000	$108,000	$106,783	$125,150
	Healthcare/Pharma	$85,300	$100,000	$100,517	$112,500
	Retail & CPG	$75,200	$90,300	$91,455	$100,000
	Tech/Telecom/Gaming	$95,300	$110,000	$114,729	$133,950
	Corporate – Other	$83,500	$100,000	$102,116	$120,000

https://cdn.prod.website-files.com/642f06aad4855fdea1778af3/68a8c0cff10f3892268eab18_2025_ai___data_science_compensation_report-compressed.pdf

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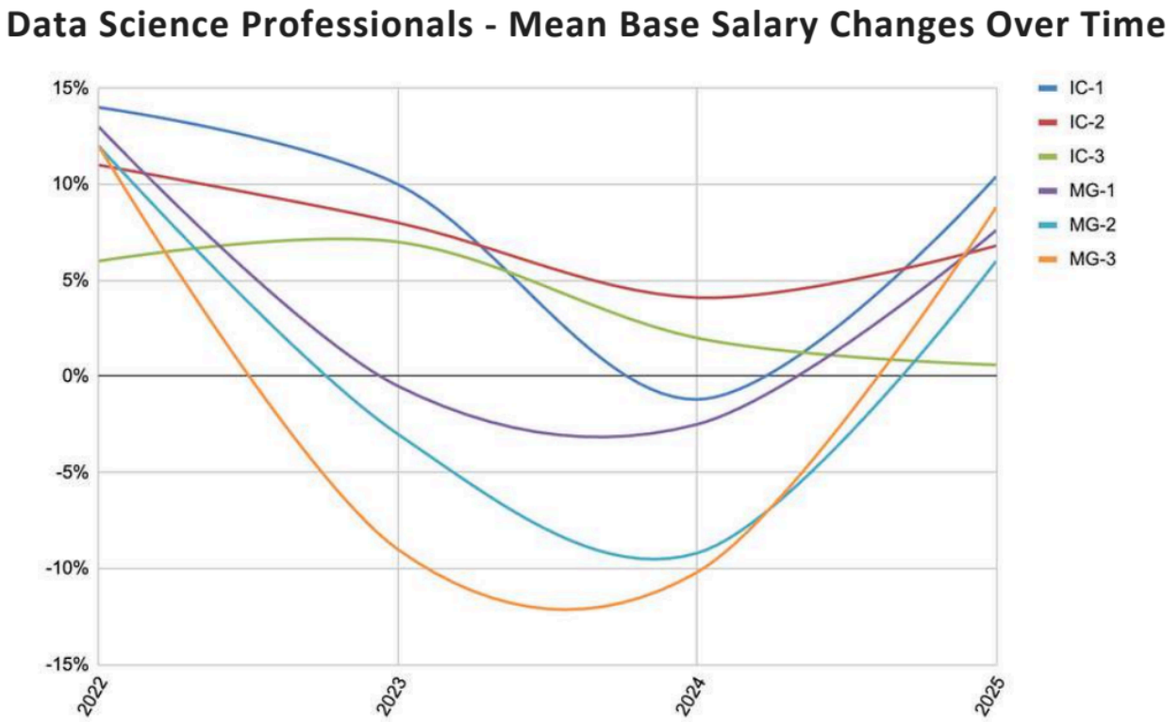
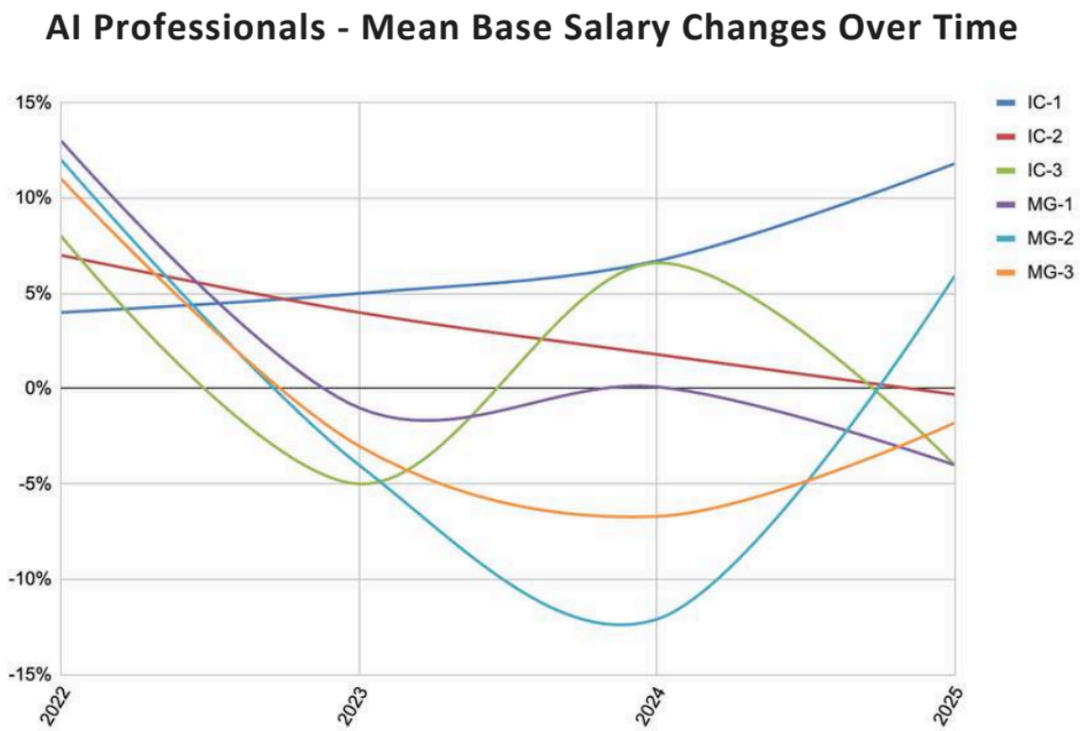
Software Eng/Data Science Salary Progression

- Software and Engineering Salaries dipped and returned back to 2022 levels
- New AI job description has seen influx of entry level grads





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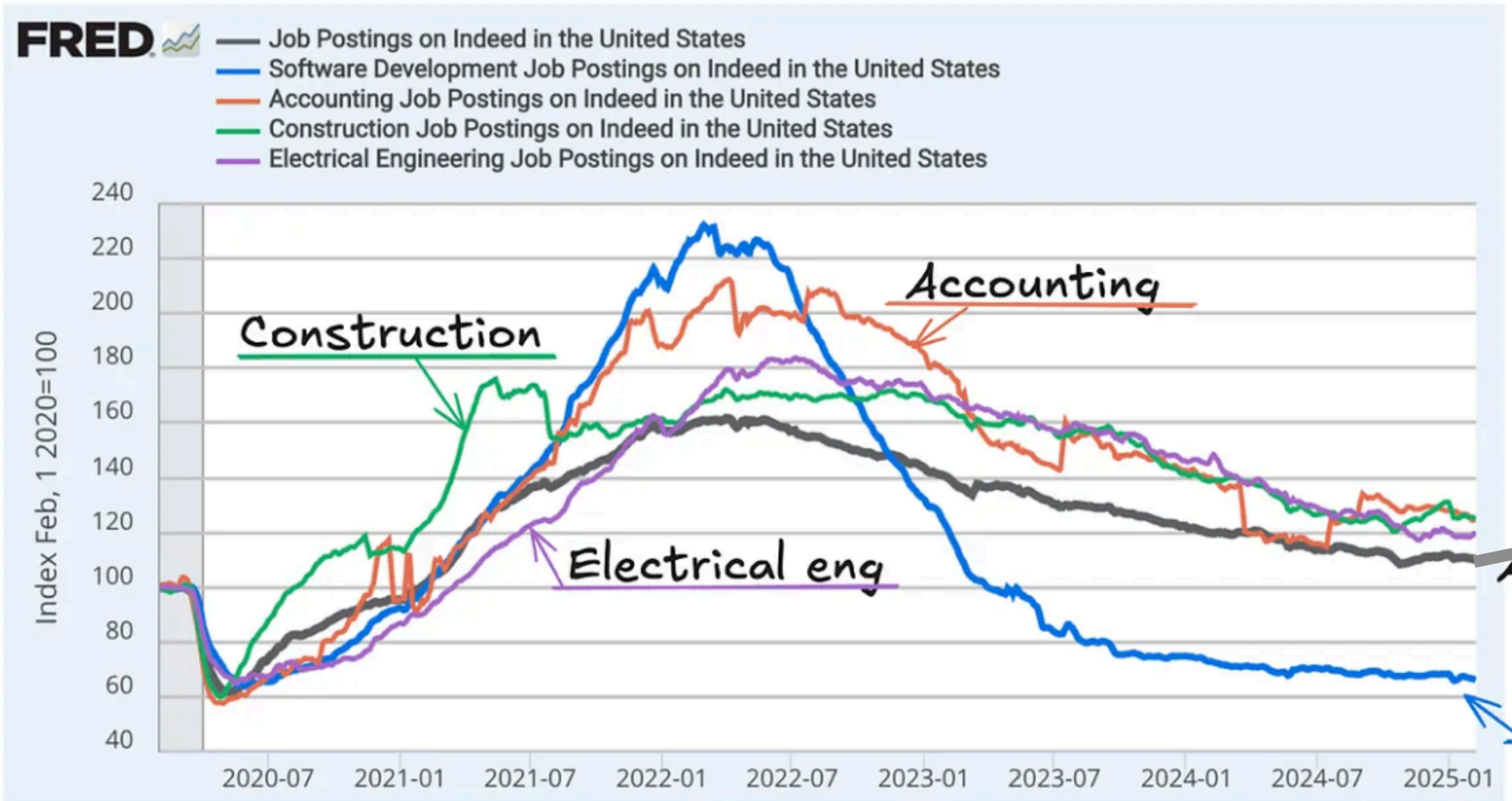
Recent Trend in Industry Jobs



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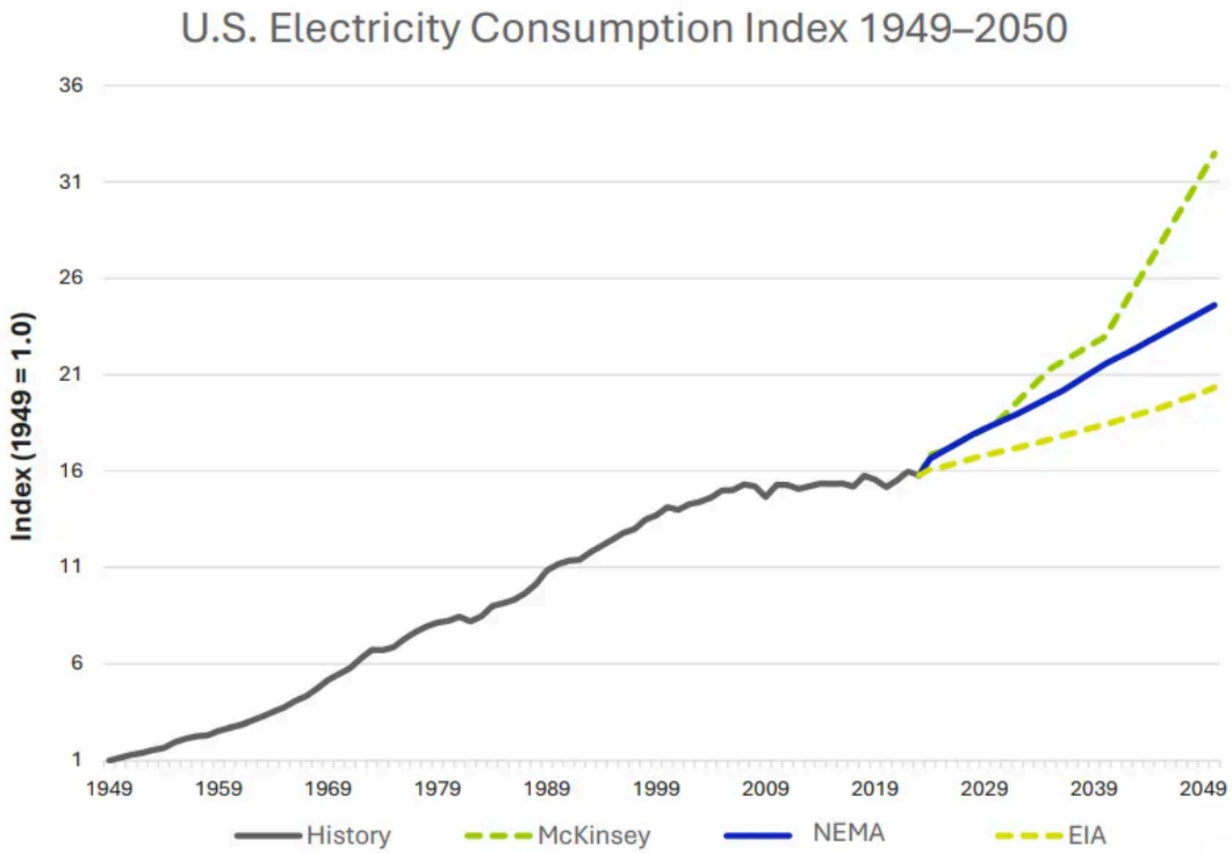
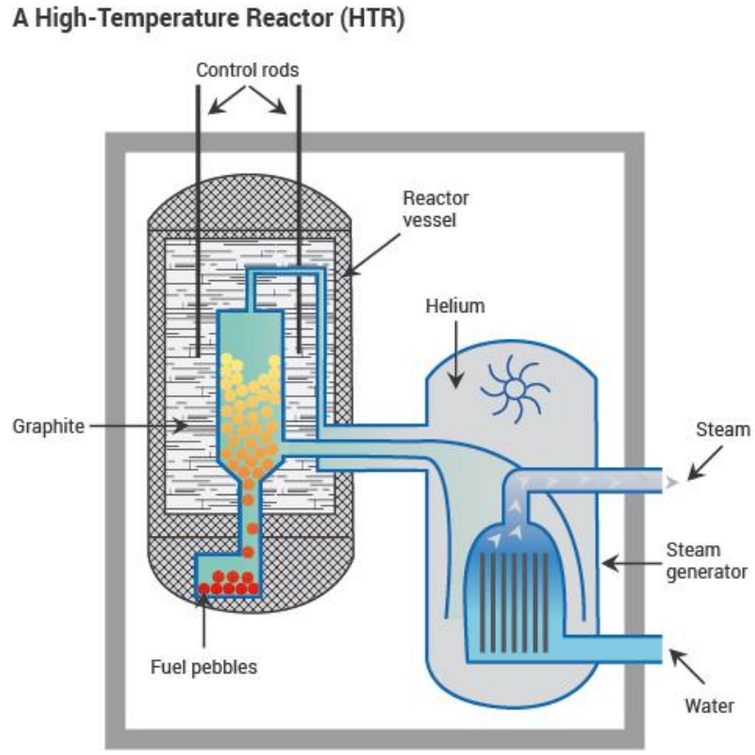
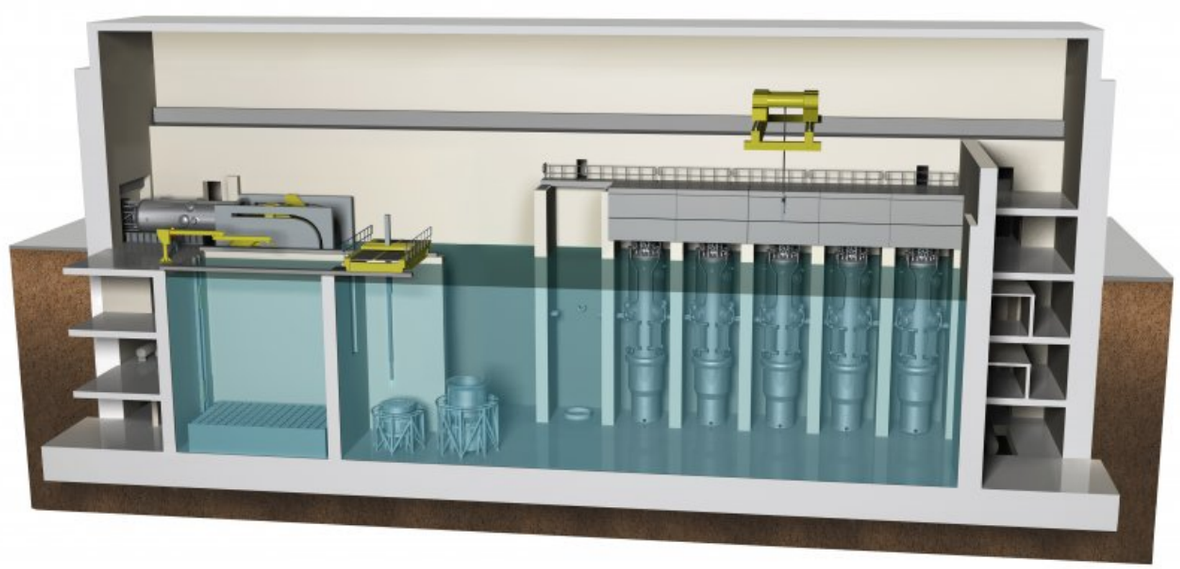


Permission granted by the National Electrical Manufacturers Association





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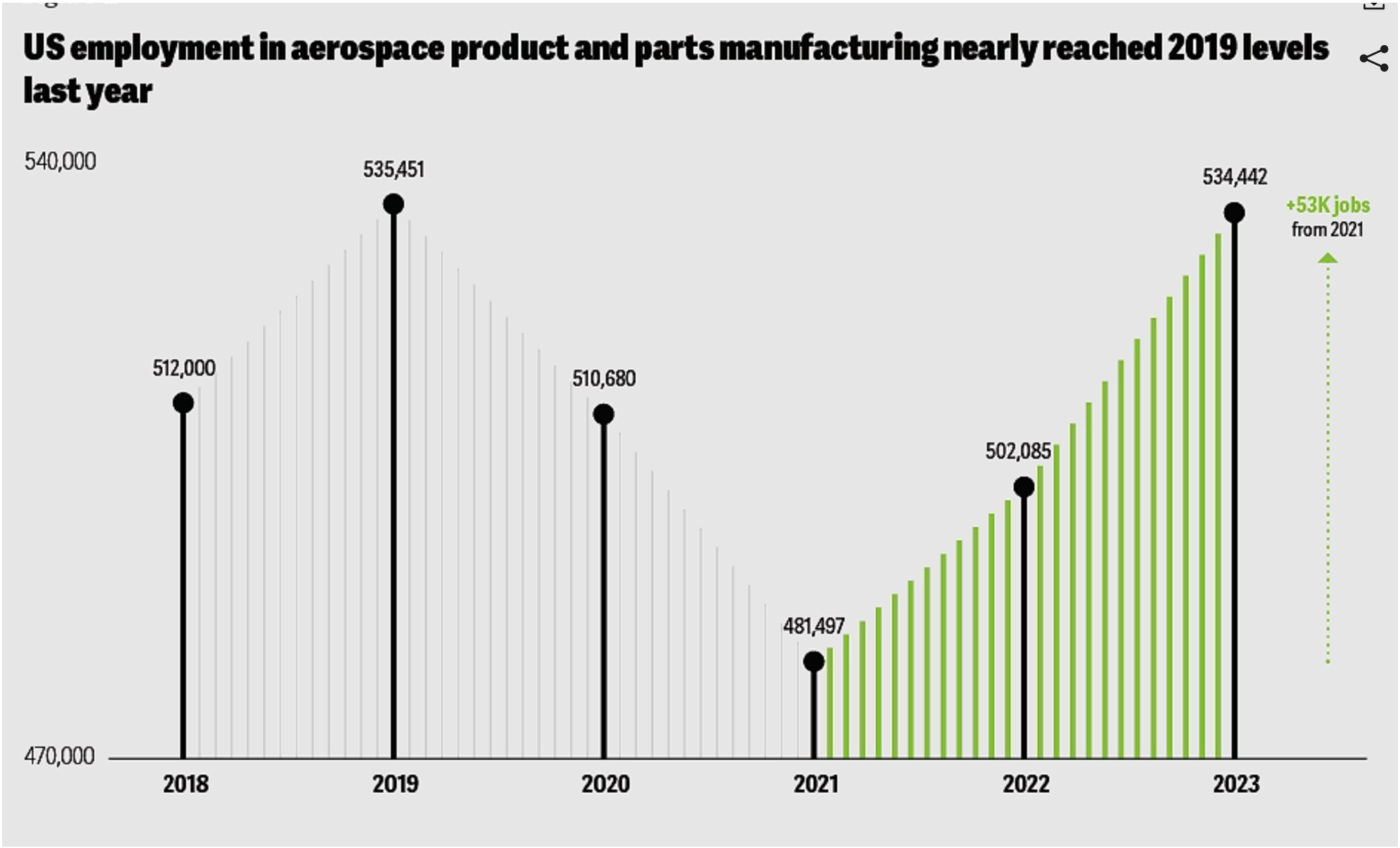

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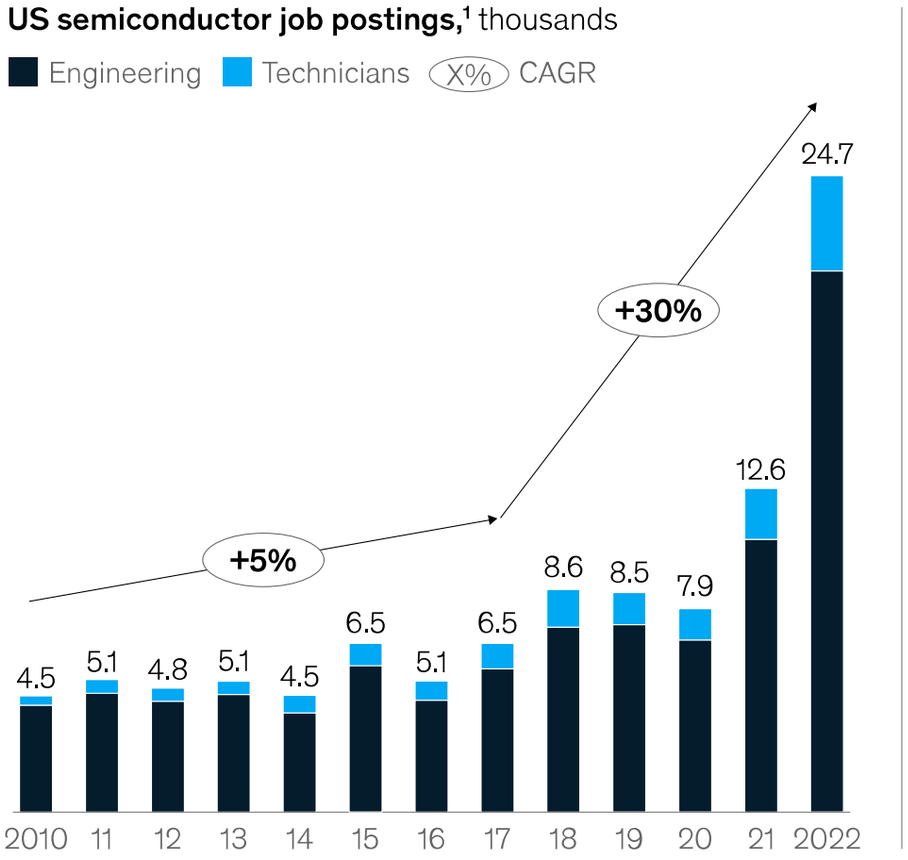
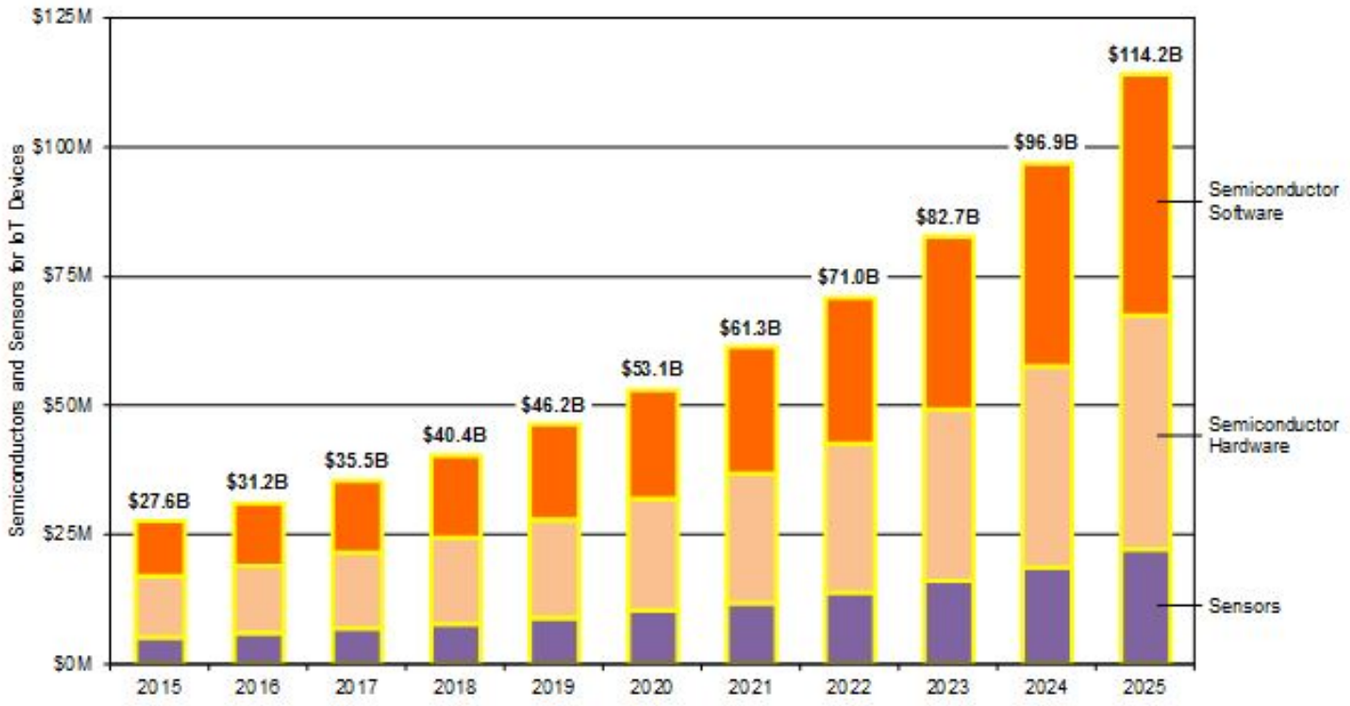
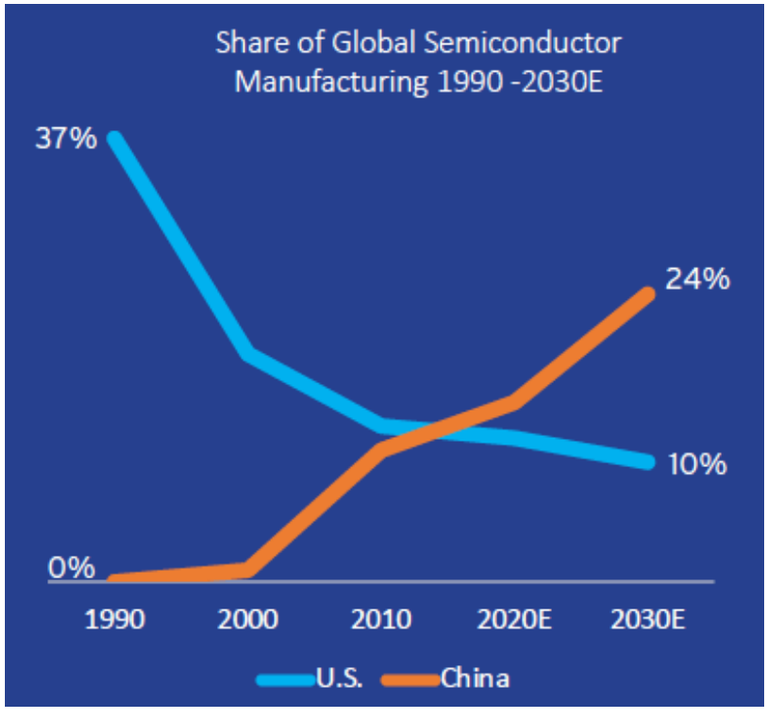
Recent Trend in Industry Jobs

Job openings in the semiconductor industry requiring more time to fill.







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Tips for getting the first job

1. Identify and learn necessary skills for your industry
2. Use back channels
3. Build a resume on **project** based experiences
4. Match resume skills to description
5. Look into **paid internships**
    1. IMHO it might be the only way in the door for some
6. Build a project while job hunting. Showcase on resume
    1. It can take 6-12 months for that first real job
7. Make resumes short, let them fill in the blanks they want in the interview
8. Efficient (fewest words) communication is key

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Key Advice From My Perspective

- Get what you came for in school - because you get what you put in
- ALWAYS have a mentor
- Company size will play a HUGE factor
- Don’t go too fast, your 20s are still for learning
- Your invested 401k or IRA dollars before 35 will be 30 times more valuable in 30 years.
- Know what you want out of a career
- Find an industry you like
- Don’t bring your frustrations to work. Toxic employees will be let go.
- Remove “I” and “You” from vocabulary. It is “We” and “Us”. All things are done as teams
- Know how your business makes money. Who is the customer (real customer)? How does what you do bring value or make the company money?
- Learn “**Sales**”. Single most important “missing” skill from physics
- Industry culture is more pressure, much faster paced (company size dependent)
- Remote work has pros and cons
- Be humble, there’s always a bigger fish

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Questions

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A Modern Career Progression

1. Figure out what ***sector*** and job type to target
2. Get first job
    1. Can take 6-12 months, assuming you already have basic skills
    2. Interview a lot, even jobs you don’t want (“Sorry, it's not a good fit”)
    3. Build portfolio project with half the time you are applying
3. Spend 2-3 years learning the industry and up-skilling
4. Change jobs or get promotion
5. Work 1 year at new position to learn and understand it
6. Consider working toward management or individual tract

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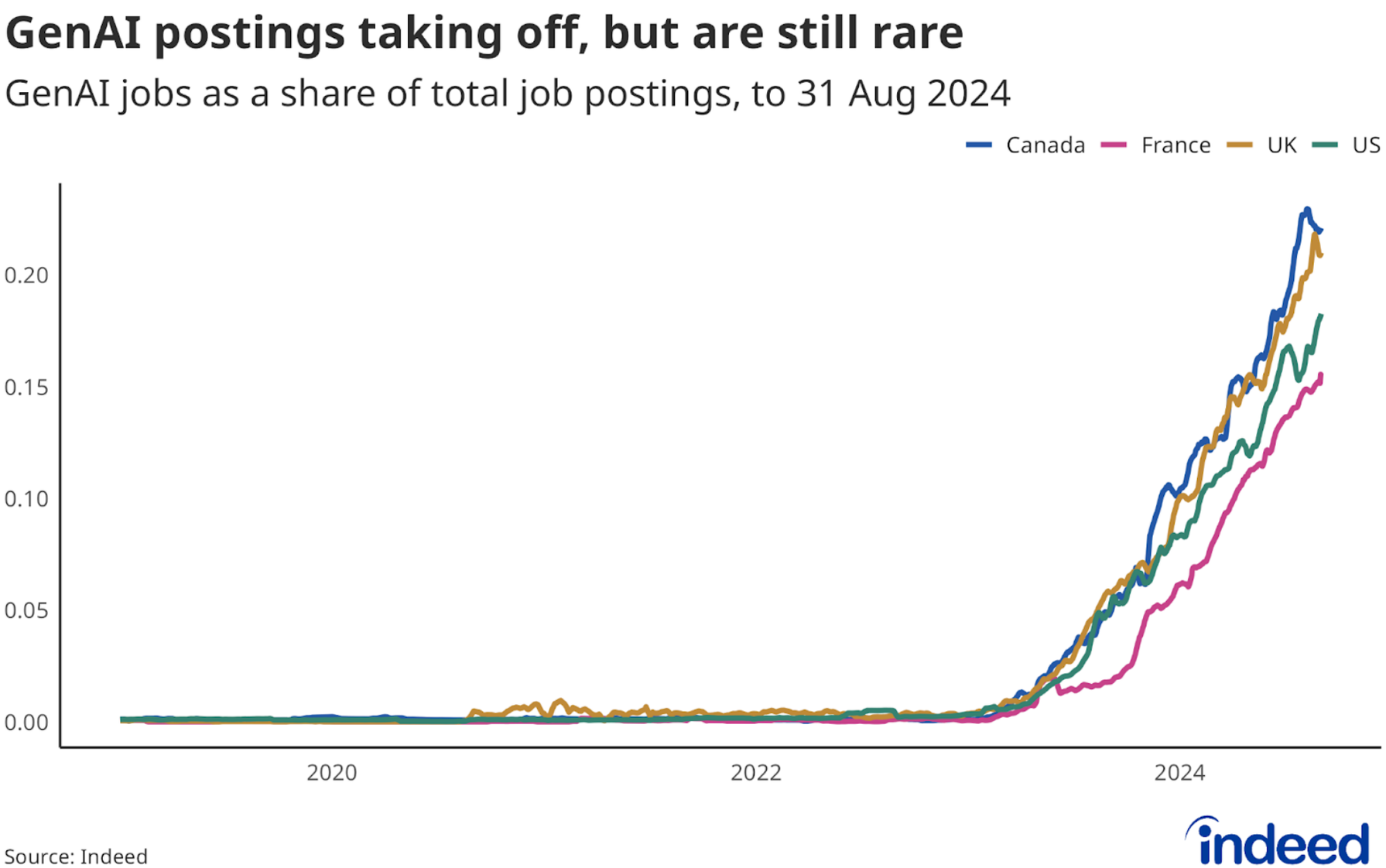
Recent Trend in Industry Jobs



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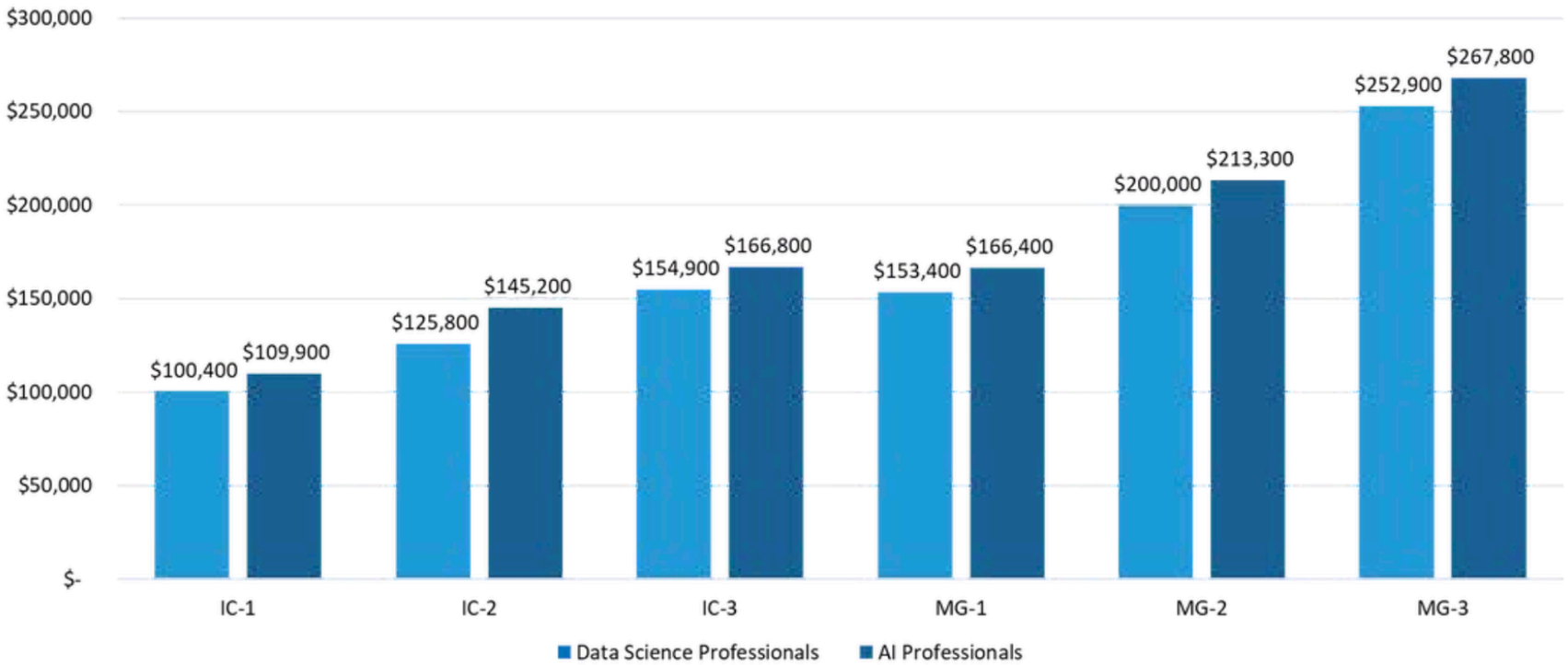
Software/Data Science Salary Progression



Data from https://www.burtchworks.com/salary-2023

Individual Contributors

Level	Responsibility	Typical Years of Experience
IC-1	Learning the job, hands-on analytics & modeling	0-3 years
IC-2	Hands-on, advanced problems, may help train analysts	4-8 years
IC-3	Analytics SMEs, mentors and trains analysts	9+ years

Managers

Level	Responsibility	Typical No. of Reports
MG-1	Tactical, leads a small team w/in a function, project execution responsibility	1-3 reports (direct or matrixed)
MG-2	Leads a function, moderately sized team, executes strategy	4-15 reports (direct or matrixed)
MG-3	Senior/executive management, determine strategy, large team	15+ reports (direct or matrixed)

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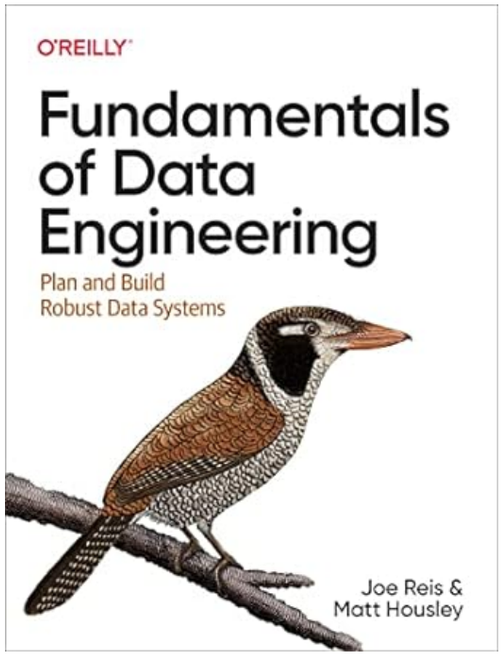
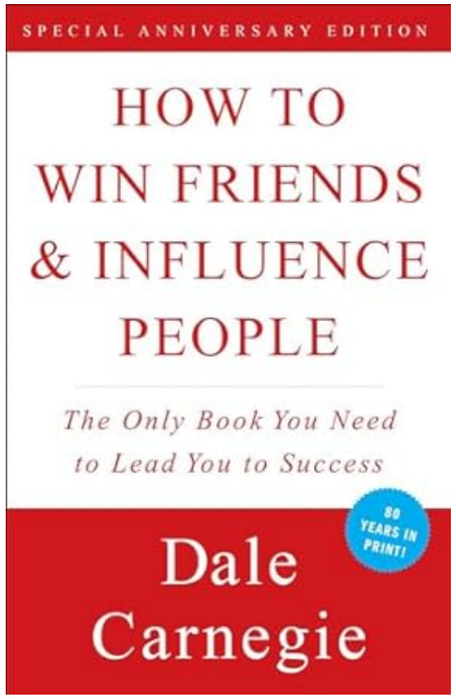
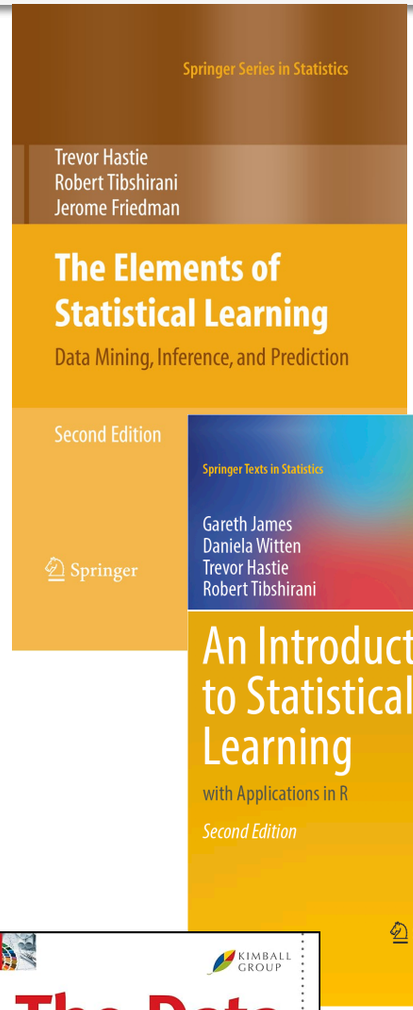
Resources For study

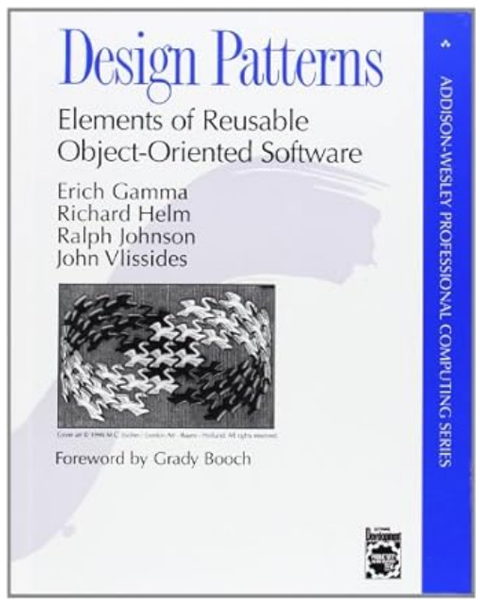
Online Resources for Data Science:

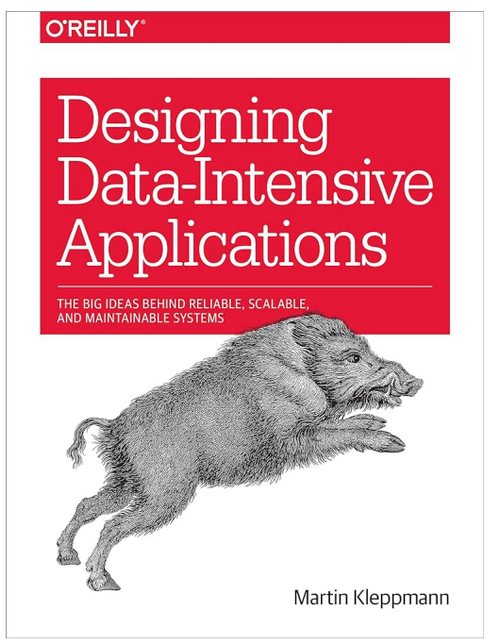
SQL Zoo
Leetcode*
AWS Fundamentals of Cloud Computing
Miguel Grinberg: Flask Mega Tutorial**

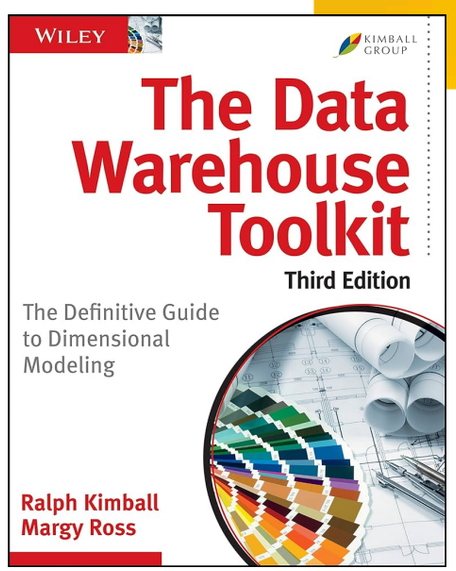












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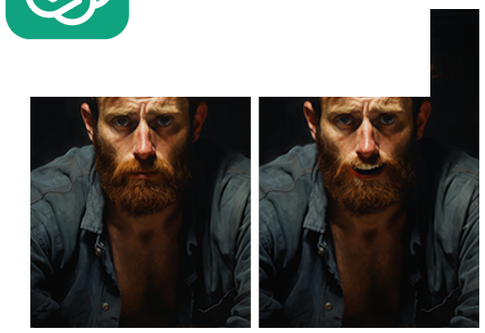
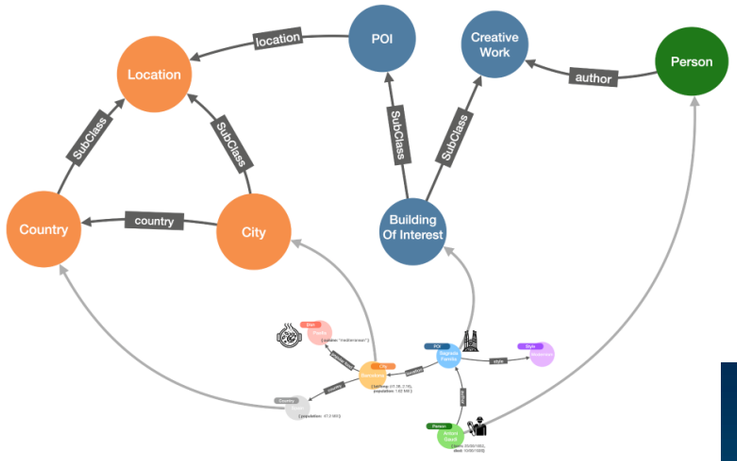
Current Hot Topics in Data Science

ChatGPT

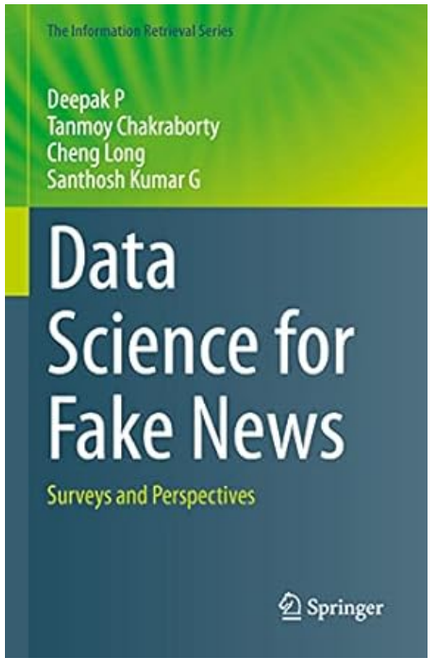
GenAI



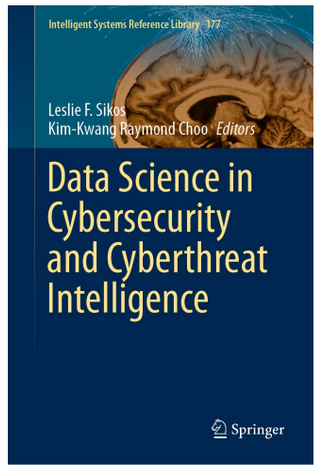
Network Analytics, knowledge graphs, and Ontologies



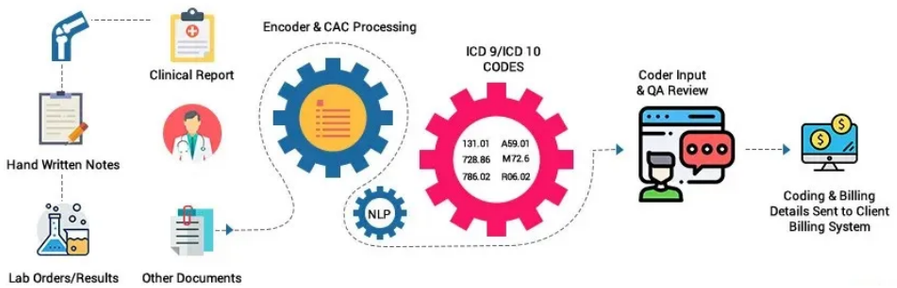
Hate Speech and PsyOp



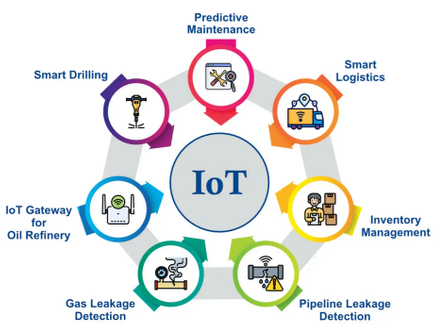
CyberSec

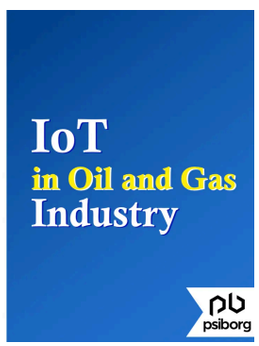


Healthcare

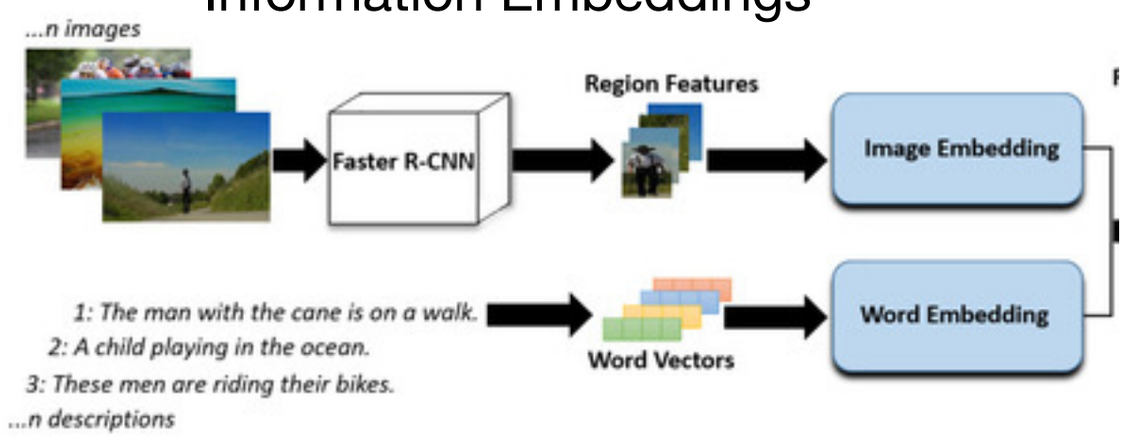


IoT





Information Embeddings



(image from https://www.mdpi.com/2313-433X/7/8/125)

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What is Data Science

Data Science Traditional Definition:
The use of advanced analytics to derive insights from data.

Data Science new Definition:
You know everything about data from creation, storage, movement, formatting, processing, machine learning, analytics, designing experiments, how it applies to business, application integration, and more.

Data Science is not an easy transition anymore.

- Lots of solved problems. There's a *right* way to do things
- Lots of hype to navigate
- Lots of BI tools to give laymen more power
- Need to learn how DS fits into products
- Most sectors require Software Engineer + Data Scientist

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Data Science Landscape

Statistics

Statistician

Insurance

Data Analyst

Quant

User Experience Research

Healthcare

Growth and UX Data Scientist

EdTech

AdTech

Financial Services

$

Data Scientist

$$$$$

Research Data Scientist

Data Steward

Oil and Gas

Database Administrator

Product Data Scientist

Aerospace

Government Contracting

AgTech

Machine Learning Engineer

Retail

Software Product Tech Companies

Data Engineer

Software Engineer

Full Stack Engineer (Web)

Software Engineering

DevOps

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General Data Science Antipatterns

- Know where to be on the “fast and loose” versus “overly structured” spectrum
- Don’t start a data science model building effort without knowing the resolution needed and estimated what is possible from the data
- Don’t neglect data collection and quality
- Look at the data distributions
- Consider the effect of time on covariance of data and out of sample errors

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