Working with AI:
Measuring the Applicability of Generative AI to Occupations

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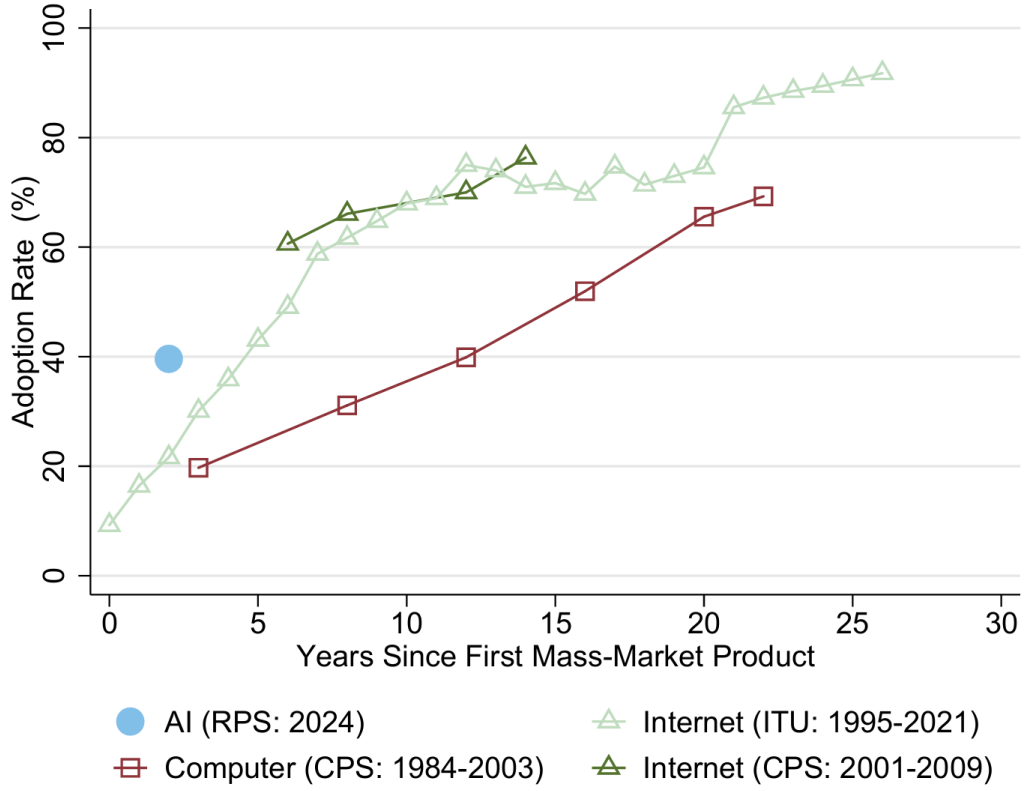
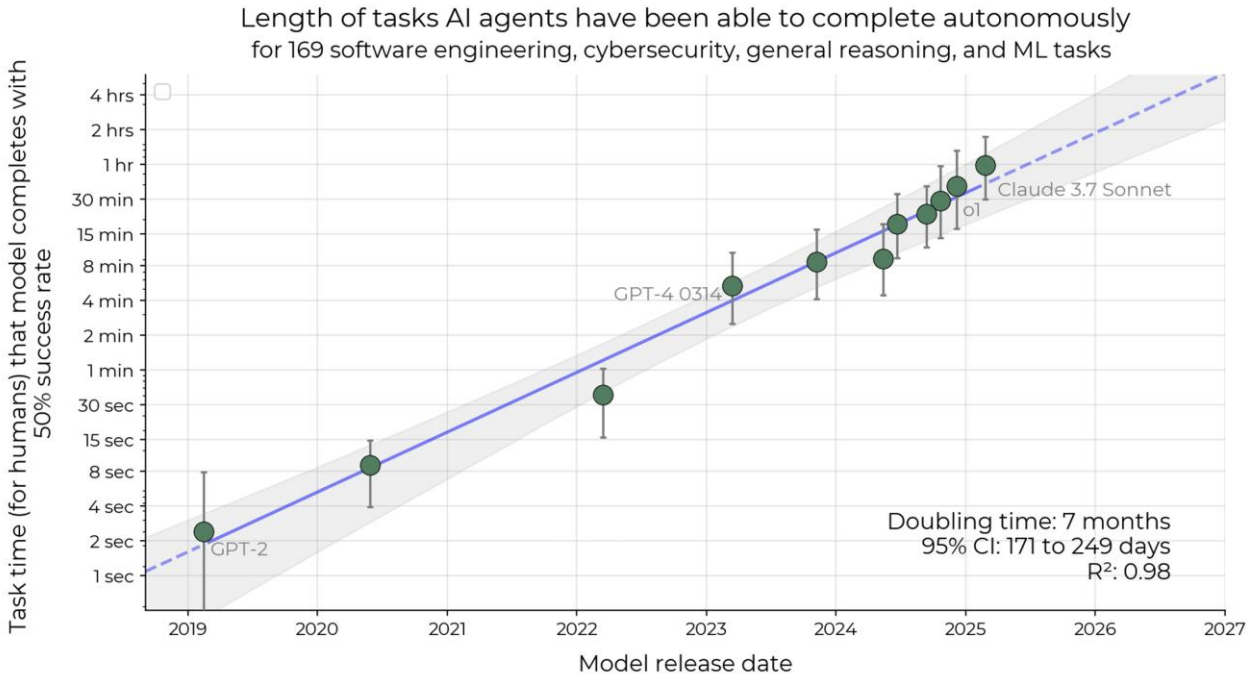
Motivation: How will LLMs change work?

[Bick, Blandin, and Deming, The rapid adoption of generative AI, 2024]



[Kwa et al., Measuring AI ability to complete long tasks, 2025]



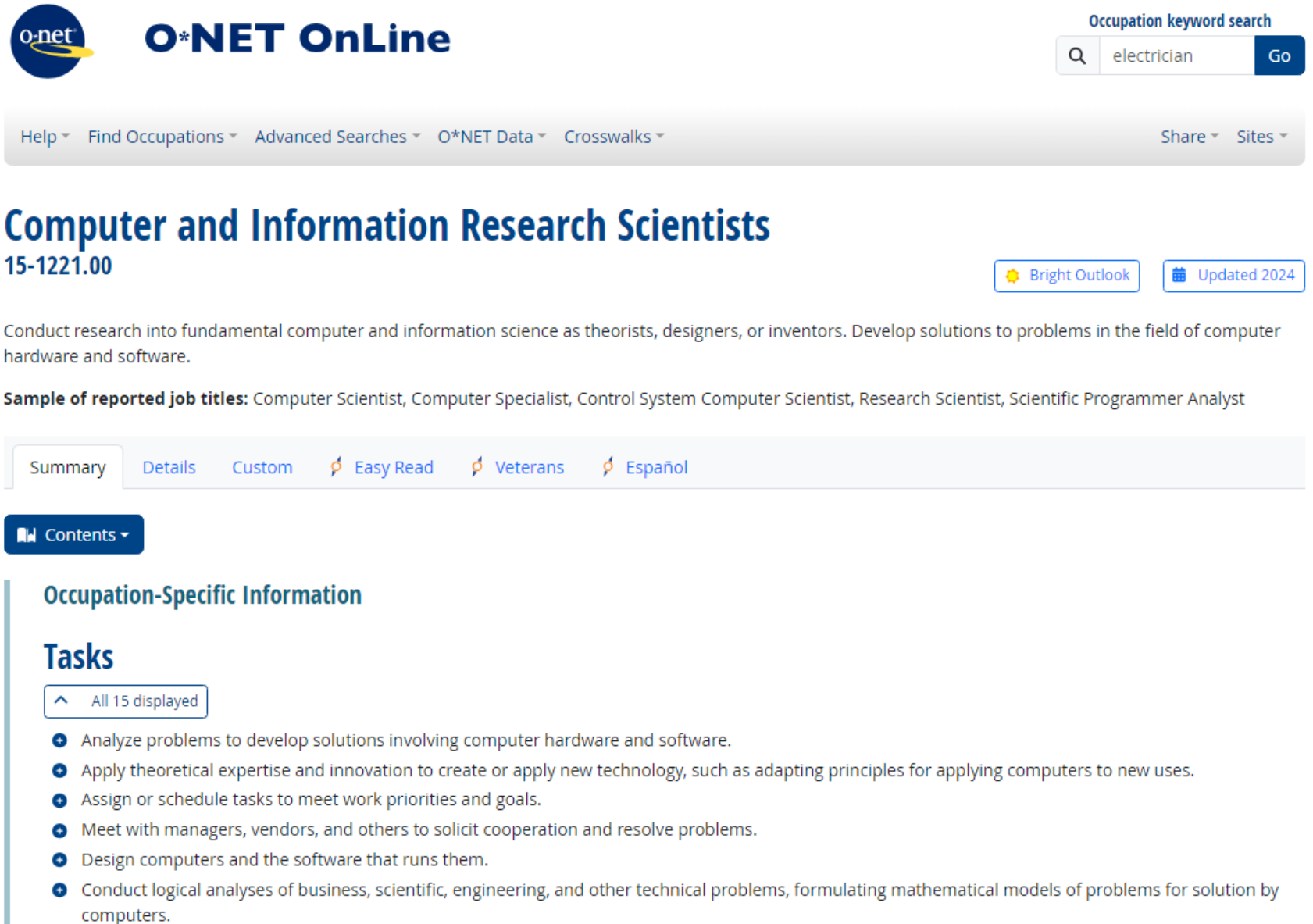
Goal: use Copilot logs to identify the applicability of LLMs to work activities ➡ occupations

Data

Random sample of US Bing Copilot logs

- 200k conversations, Jan-Sep 2024
- 100k sampled from convs. w/ thumbs feedback

Work Activity taxonomy



Occupation
~1k

Computer and Information Research Scientists

|

Task
~18k

Conduct logical analyses of business, scientific, engineering, and other technical problems, formulating mathematical models of problems for solution by computers.

|

Detailed Work Activity (DWA)
~2k

Analyze data to identify trends or relationships among variables.

|

Intermediate Work Activity (IWA)
~300

Analyze scientific or applied data using mathematical principles.

Map Copilot conversations to IWAs + evaluate demonstrated capability

Conversation example

Key insight:
The user goal may differ from the AI action, and this is ok!

LLMs are applicable to work in multiple ways

[command line error message]

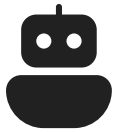
User goal: **resolve** software configuration error

↓ *IWA*

Resolve computer problems

1) Helping a user with their work

Programmers, sys admins, …



[instructions for updating configuration file]

AI action: **advise** on software configuration modifications

↓ *IWA*

Advise others on the design or use of technologies

Explain technical details of products or services

2) Performing the work of a third party

IT, tech support, …

Classification

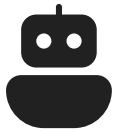
GPT-4o
GPT-4o mini

[command line error message]

User goal: **resolve** software configuration error

↓ ***IWA (user goal)***

Resolve computer problems → ***Scope of impact (0-5)***



[instructions for updating configuration file]

AI action: **advise** on software configuration modifications

↓ ***IWA (AI action)***

Advise others on the design or use of technologies → ***Scope***

Explain technical details of products or services → ***Scope***

Completion (did the AI complete the user's goal?)

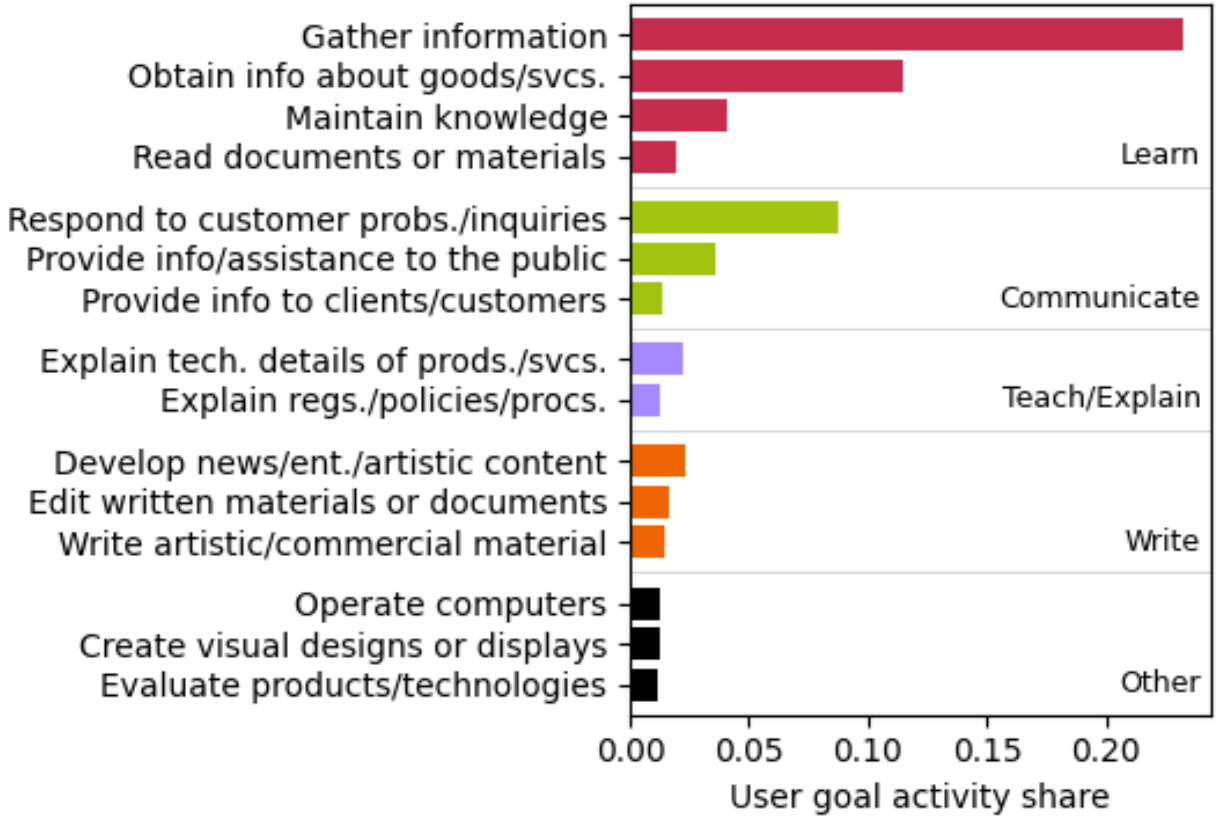
Results

1. What work activities do people use Copilot for?
2. Which work activities are most successful?
3. What occupations have the highest AI applicability?
4. How does this compare to predictions of AI impact?
5. Socioeconomic correlates

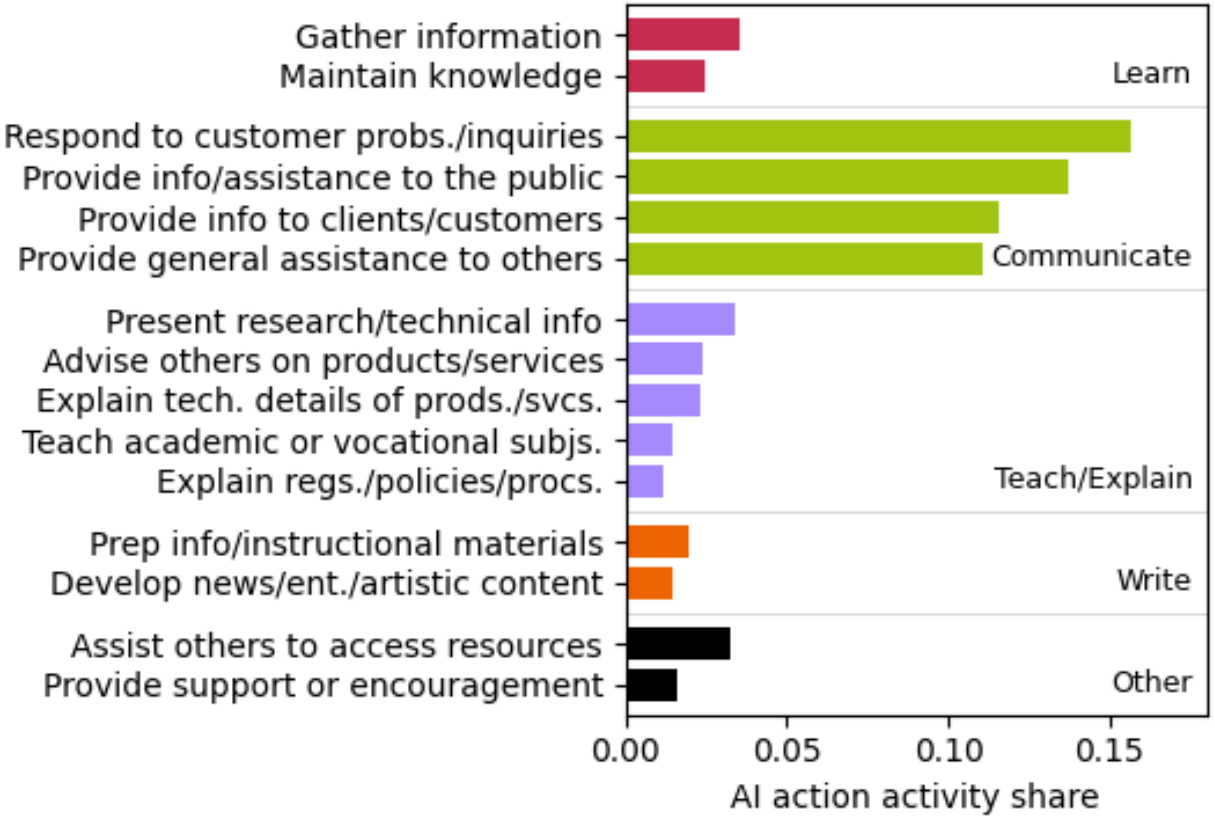
What work activities do people use Copilot for?

Most common IWAs

Top user goals



Top AI actions

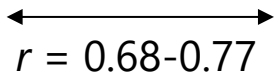


In 96% of conversations, Jaccard(user goals, AI actions) < 0.5
(more IWAs unique to each side than in common)

Which work activities are most successful?

User signal

Thumbs feedback



LLM classification

Completion

Scope of impact

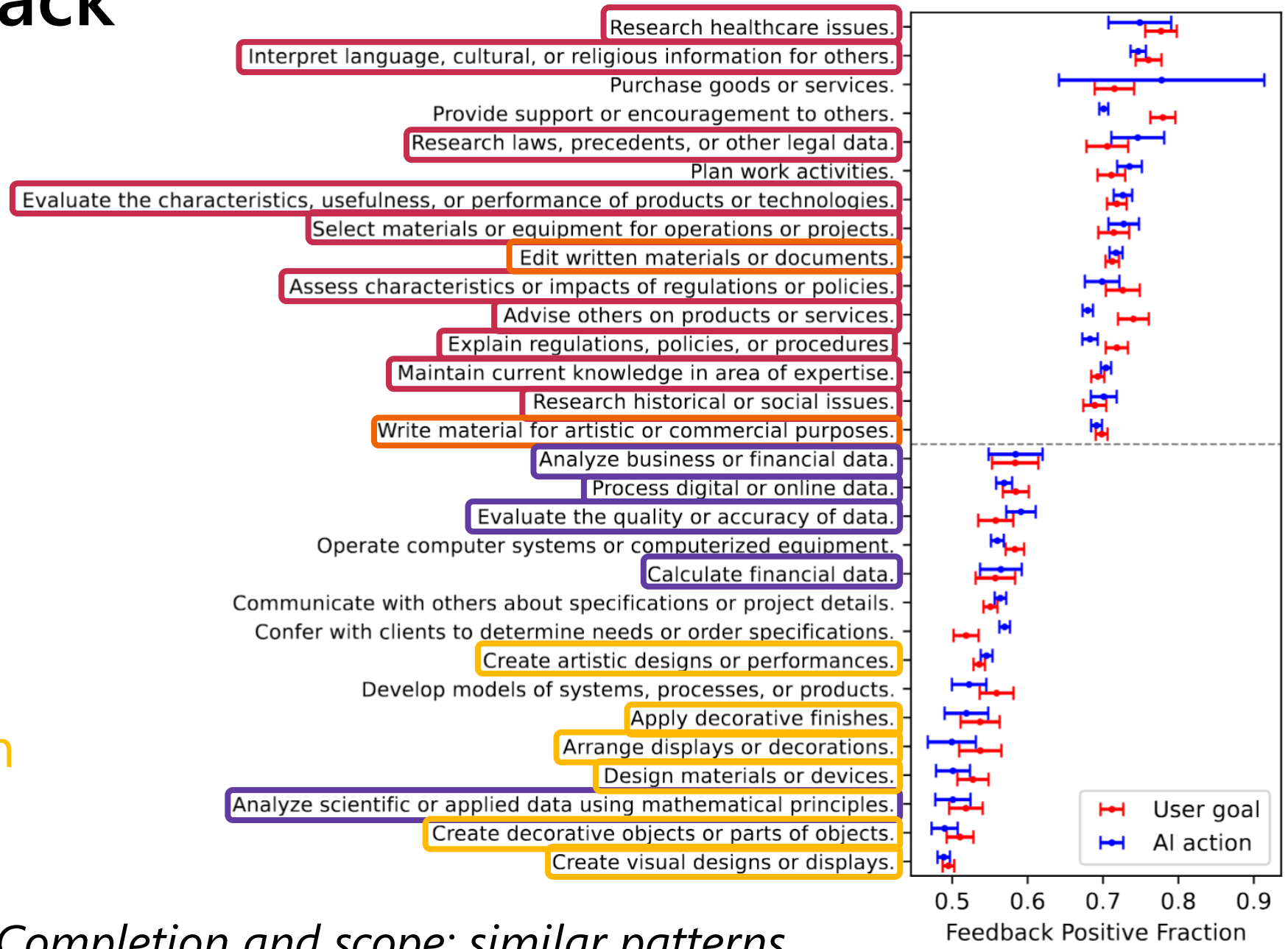
Thumbs feedback

Research, evaluation, interpretation

Writing

Data analysis

Image generation and design



Completion and scope: similar patterns

What occupations have the highest AI applicability?

Occupations: *AI Applicability Score*

$$a_i = \sum_j \quad w_{ij} \quad \cdot \quad \mathbf{1}\{f_j \geq .0005\} \cdot c_j \quad \cdot \quad s_j$$

IWAs that job *i* does

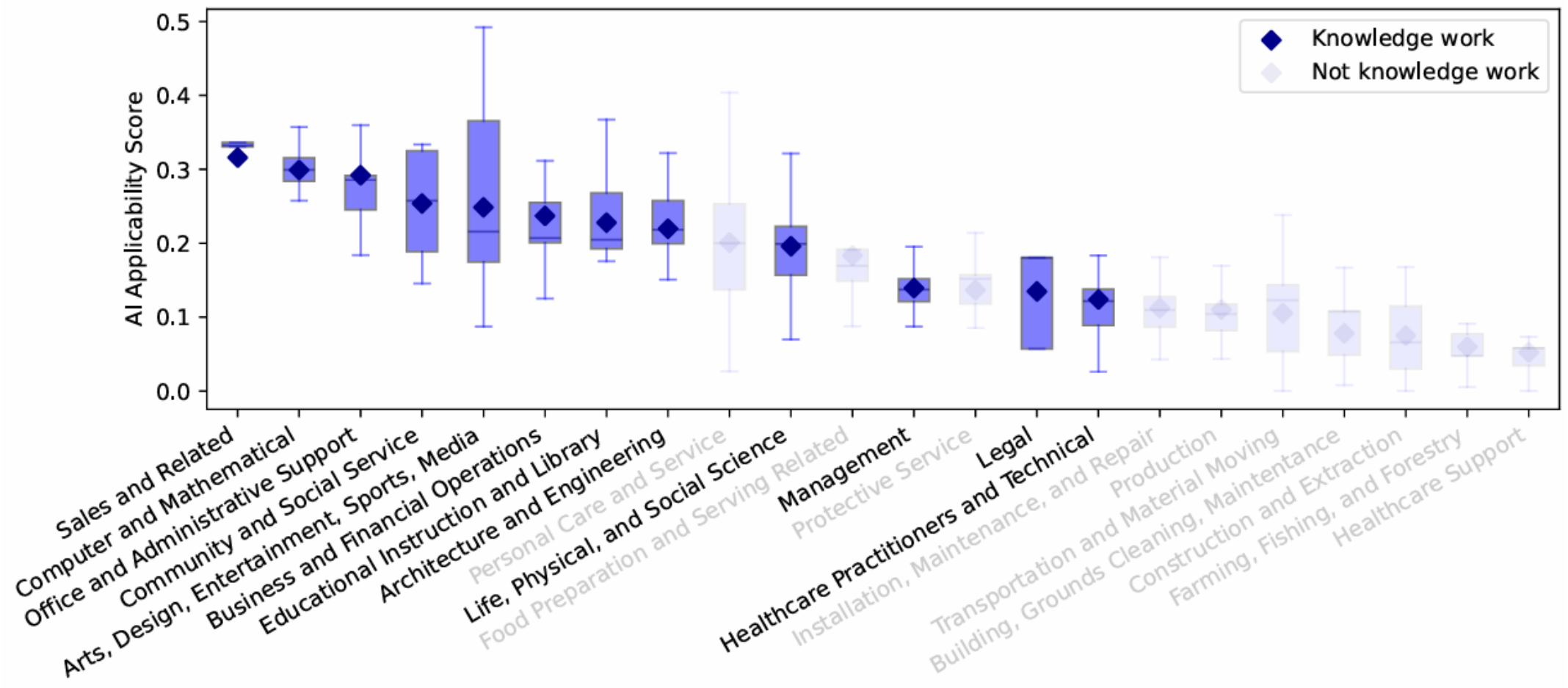
Weight of IWA *j* in job *i* *(from O*NET ratings)*

Is there nontrivial AI usage for *j*?

Completion rate of *j*

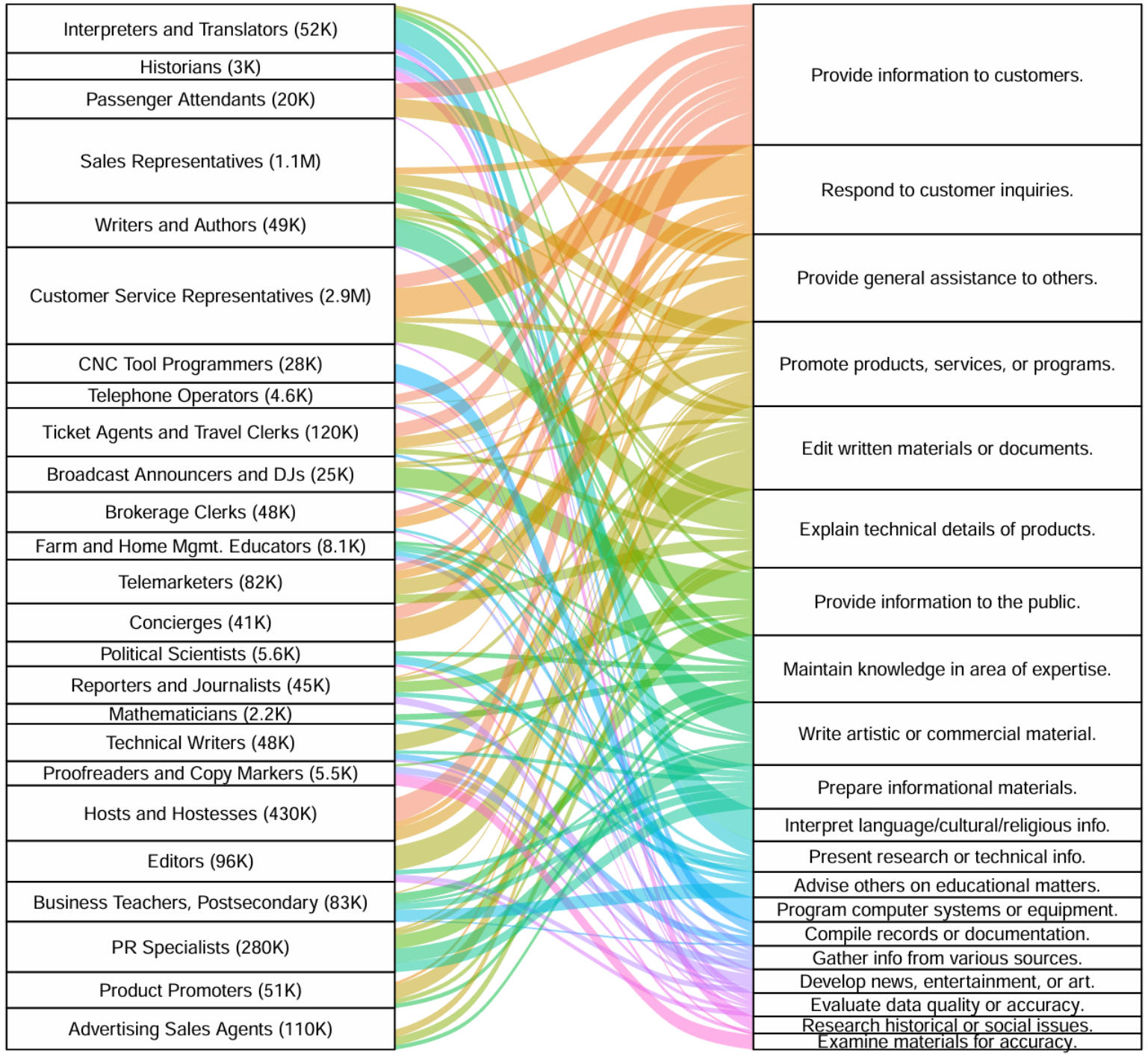
Scope score of *j*

AI applicability is highest for *knowledge work*



By *AI applicability score*

- Customer service
- Sales
- Writers
- Clerks
- Programmers
- Analysts
- Teachers



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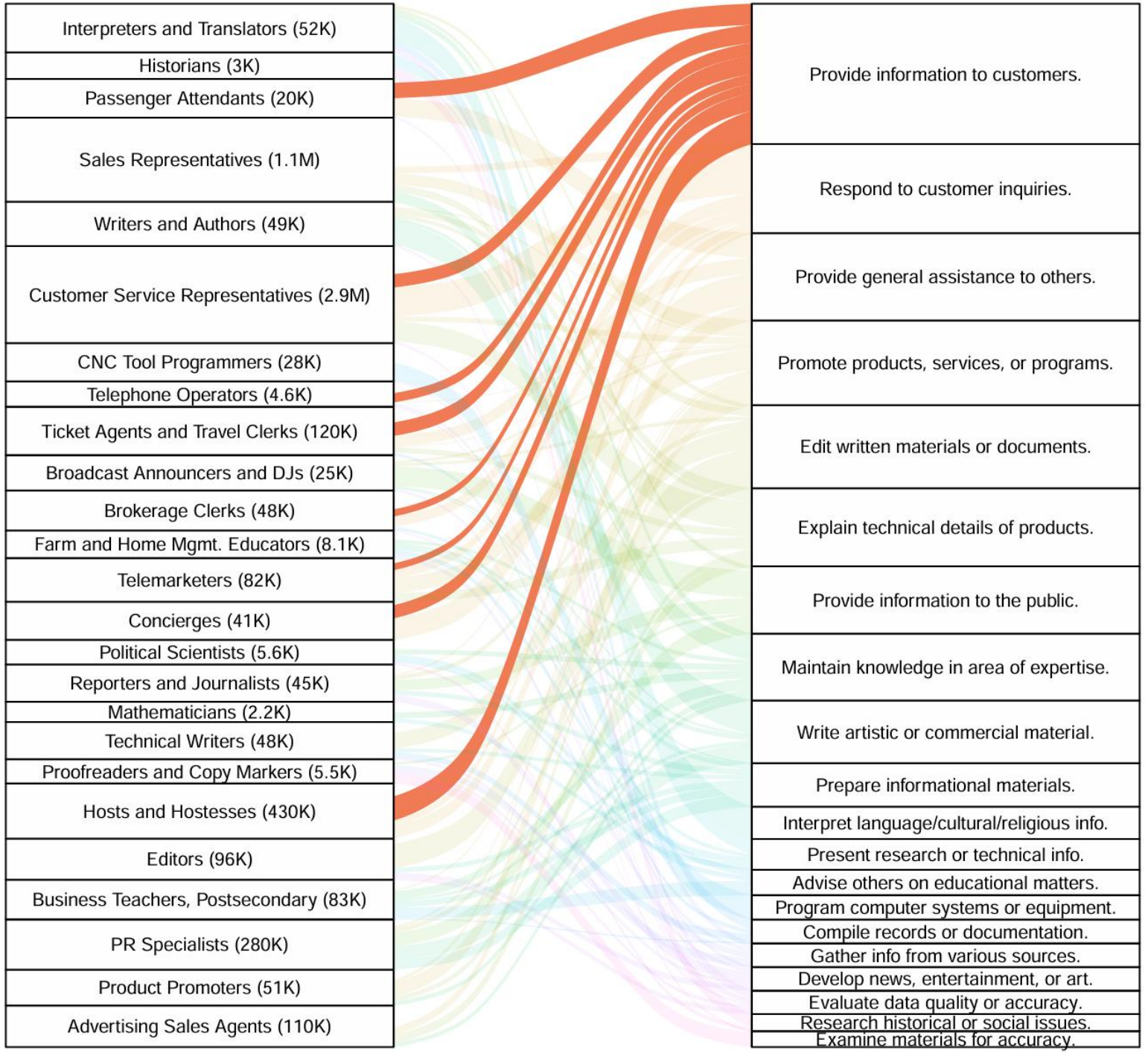

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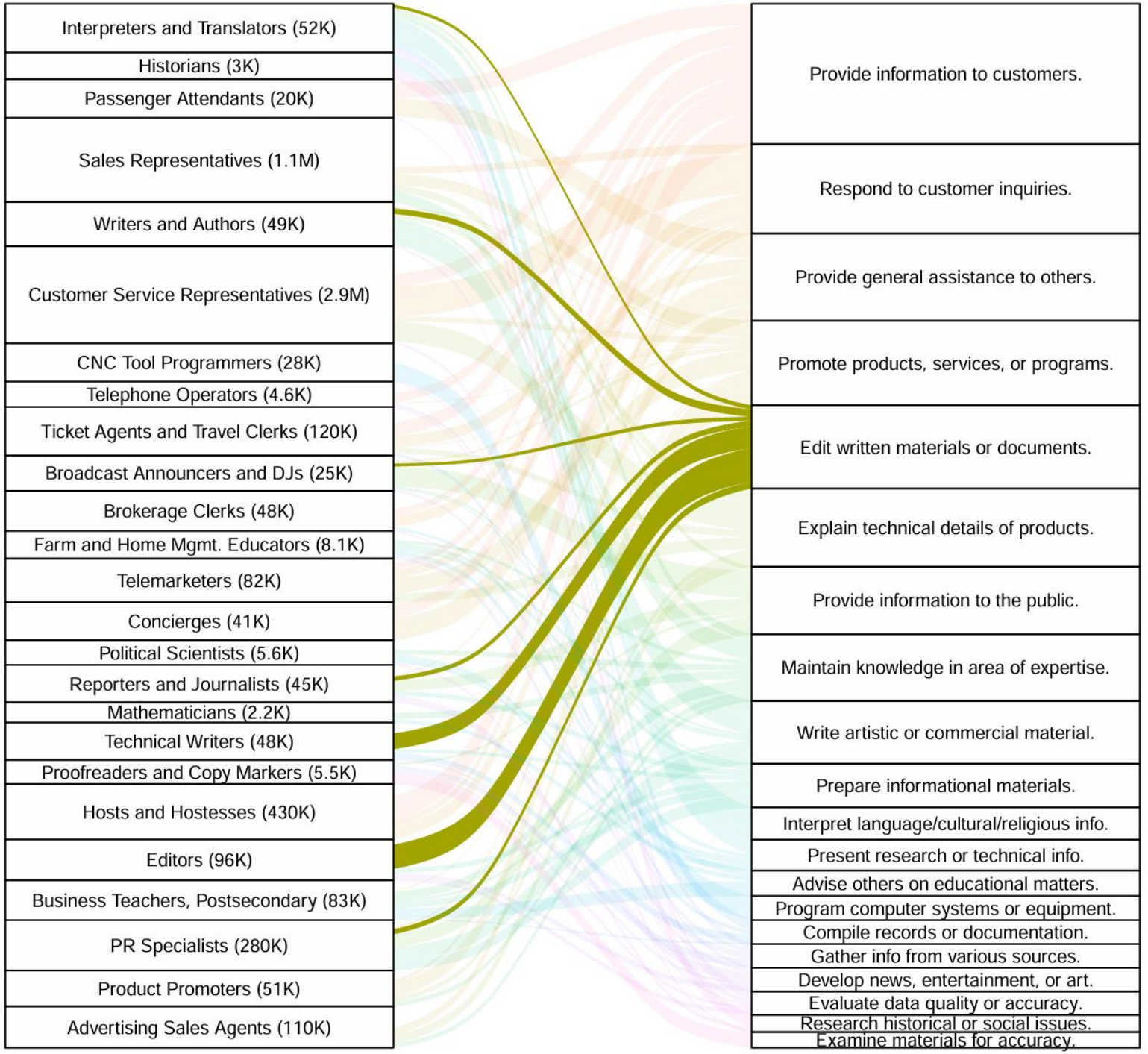

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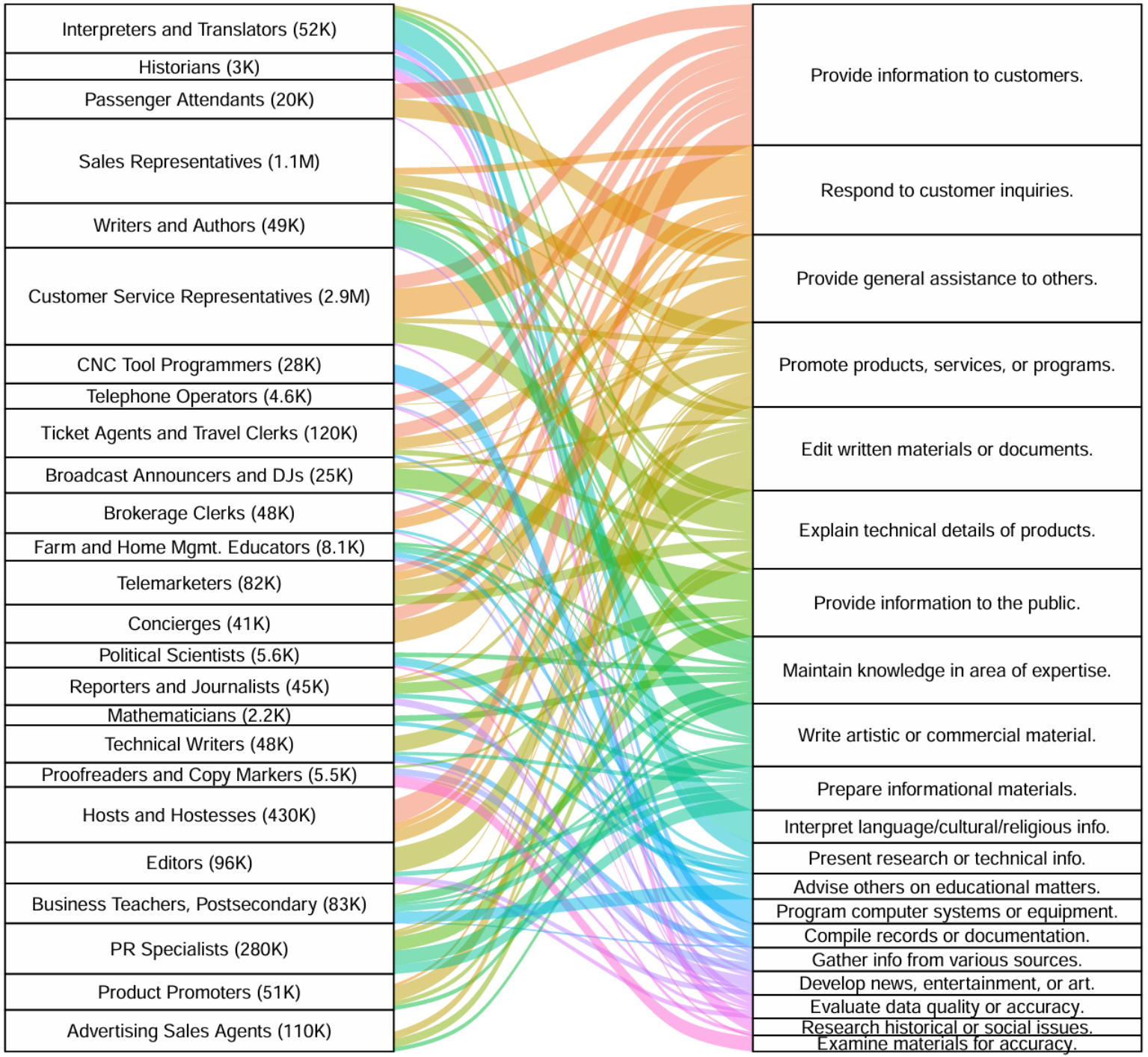


The Washington Post
Democracy Dies in Darkness

Will historians really be replaced by AI? They remain skeptical.

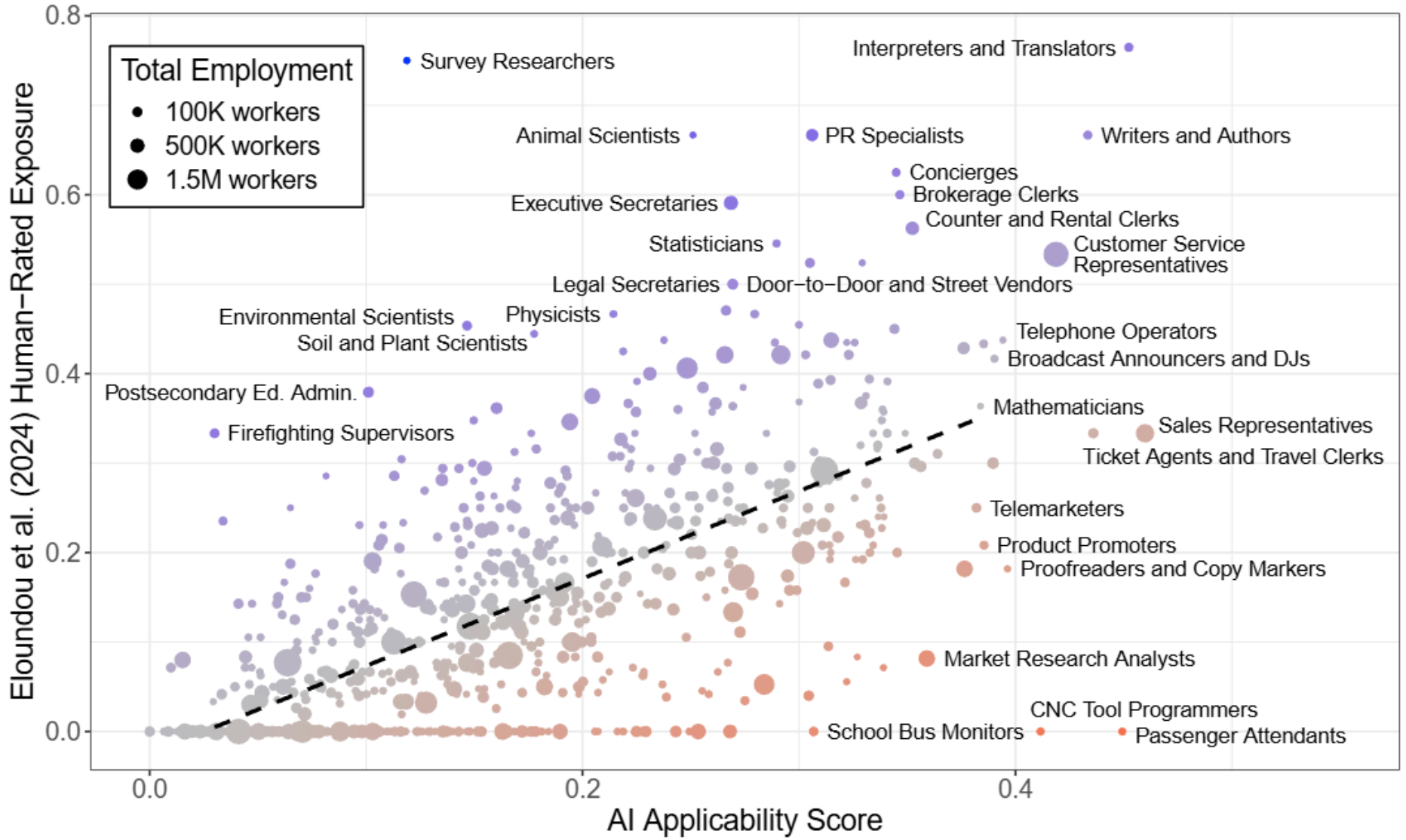
A recent Microsoft study sent shockwaves with its rankings of threatened jobs. But some historians dismiss the idea, offering lessons for others.

By Todd C. Frankel

Minor Group Title (Abbr.)	Score	Minor Group Title (Abbr.)	Score	Minor Group Title (Abbr.)	Score
Media and Communication Workers*	0.39	Food and Beverage Serving Workers**	0.21	Top Executives**	0.12
Information and Record Clerks**	0.37	Air Transportation Workers	0.21	Woodworkers	0.12
Sales Representatives, Services**	0.36	Art and Design Workers*	0.21	Construction and Extraction Sups.*	0.11
Communications Equipment Operators	0.35	Material Recording and Dist'n Workers**	0.20	Health Technologists and Technicians**	0.11
Tour and Travel Guides	0.34	Media and Comms. Equip. Workers	0.20	Assemblers and Fabricators*	0.11
Retail Sales Workers**	0.33	Prim., Second., and Special Ed. Teachers**	0.19	Metal Workers and Plastic Workers*	0.11
Sales Reps., Wholesale and Manufacturing*	0.33	Transport. and Material Moving Sups.*	0.18	Printing Workers	0.11
Mathematical Science Occupations	0.32	Marketing, PR, and Sales Managers*	0.18	Other Maintenance Workers**	0.10
Baggage Porters, Bellhops, and Concierges	0.32	Electric Equip. Mechanics	0.18	Vehicle and Mobile Equip. Mechanics*	0.10
Other Sales and Related Workers	0.32	Architects, Surveyors, and Cartographers	0.17	Water Transportation Workers	0.09
Postsecondary Teachers*	0.31	Lawyers, Judges, and Related Workers*	0.17	Firefighting and Prevention Workers	0.09
Entertainment Attendants and Related*	0.30	Other Personal Care and Service Workers*	0.17	Other Production Occupations**	0.08
Computer Occupations**	0.30	Sports Entertainers and Related*	0.17	Bldg. Cleaning and Pest Control Workers**	0.08
Other Office and Admin. Workers**	0.29	Other Healthcare Pracs. and Workers	0.16	Personal Appearance Workers*	0.08
Librarians, Curators, and Archivists	0.29	Other Transportation Workers	0.16	Protective Service Sups.	0.08
Religious Workers	0.27	Cooks and Food Preparation Workers**	0.16	Farming, Fishing, and Forestry Sups.	0.08
Personal Care and Service Sups.	0.27	Funeral Service Workers	0.15	Material Moving Workers**	0.08
Secretaries and Administrative Assistants**	0.27	Other Protective Service Workers*	0.15	Occupational and Physical Therapy Assts.	0.07
Financial Clerks**	0.27	Other Food Prep. and Serving Workers*	0.15	Construction Trades Workers**	0.07
Other Teachers and Instructors*	0.26	Building, Grounds, and Maint. Sups.	0.15	Other Construction and Related Workers	0.06
Social Scientists and Related	0.26	Law Enforcement Workers*	0.15	Agricultural Workers	0.06
Counselors and Social Workers**	0.25	Other Management Occupations**	0.14	Legal Support Workers	0.06
Supervisors of Production Workers*	0.25	Occ. Health and Safety Specialists	0.14	Helpers, Construction Trades	0.06
Office and Administrative Support Sups.*	0.25	Food Preparation and Serving Sups.*	0.14	Other Healthcare Support Occupations*	0.06
Business Operations Specialists**	0.24	Installation and Maintenance Sups.*	0.14	Textile, Apparel, and Furnishing Workers	0.05
Animal Care and Service Workers	0.24	Life, Phys., and Social Science Tech'ns	0.14	Extraction Workers	0.05
Financial Specialists**	0.24	Operations Specialties Managers**	0.14	Home Health Aides and Nursing Assts.**	0.05
Engineers*	0.23	Motor Vehicle Operators**	0.14	Grounds Maintenance Workers*	0.05
Other Educational and Library Workers*	0.22	Supervisors of Sales Workers*	0.14	Plant and System Operators	0.04
Physical Scientists	0.21	Healthcare Dx'g and Treating Pracs.**	0.13	Forest and Conservation Workers	0.03
Drafters and Eng. and Mapping Tech'ns*	0.21	Rail Transportation Workers	0.13		
Life Scientists	0.21	Food Processing Workers*	0.12	** >2M employed, *>500k employed	

How does this compare to predictions?

Expectations are borne out in the data

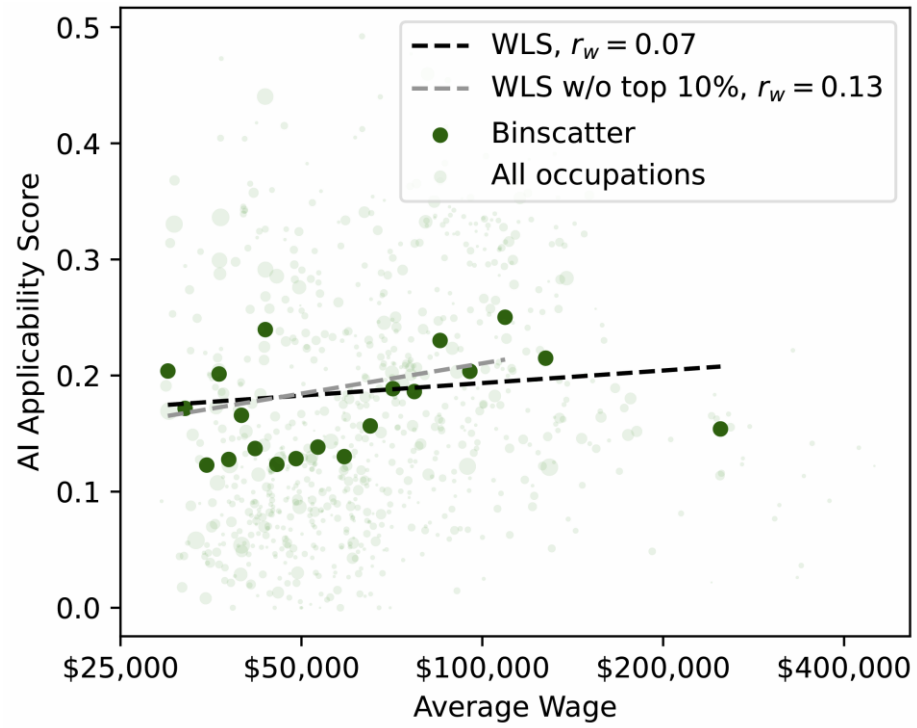


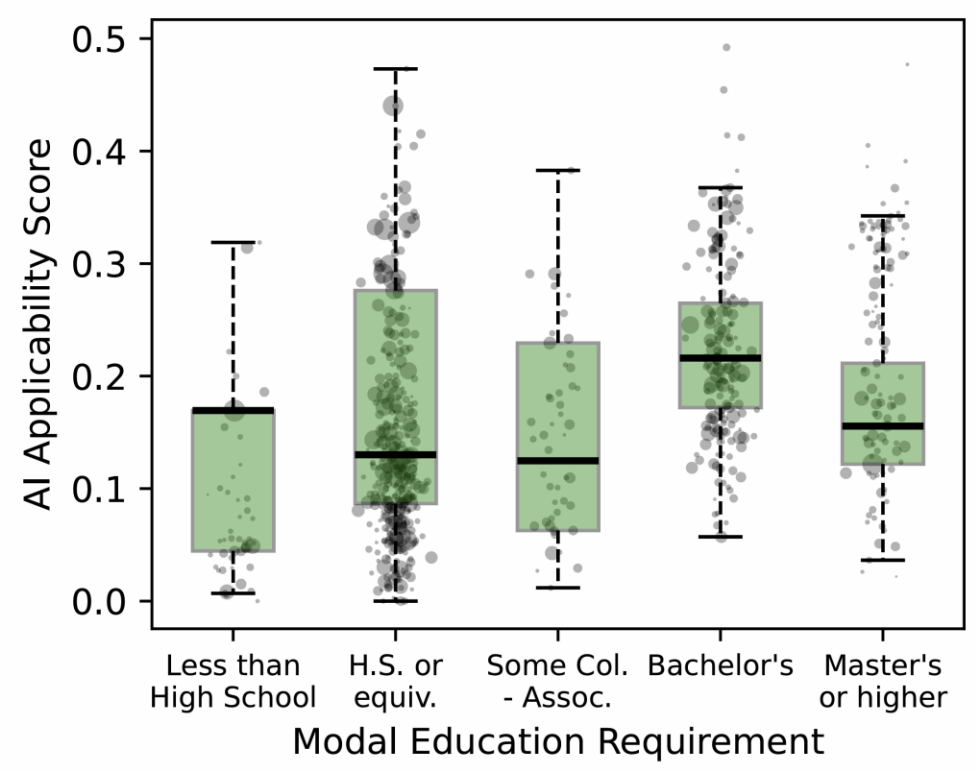
Employment-weighted r = 0.73

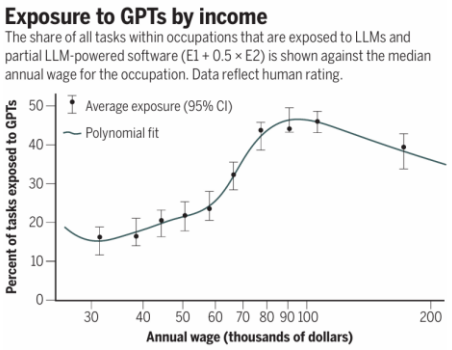
At the major group level, r = 0.91

Socioeconomic correlates

AI applicability by wage & education





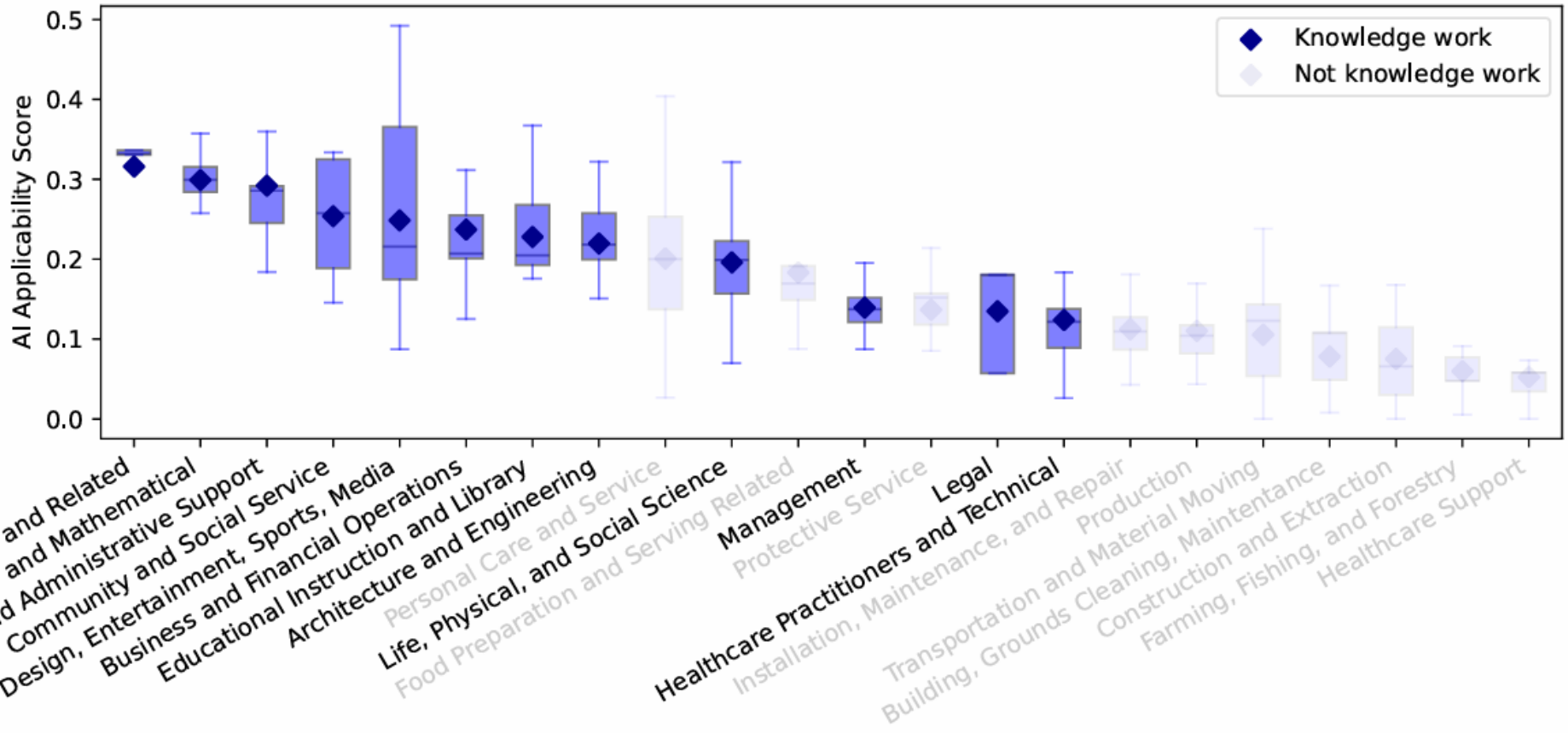


Weighting by employment shows lower correlation: sales, office/admin jobs

[Eloundou et al. 2024], unweighted

Conclusion:

Usage data shows AI is most applicable to **knowledge work** and **communication** occupations—and is at least somewhat relevant to nearly all jobs.



Thank you!

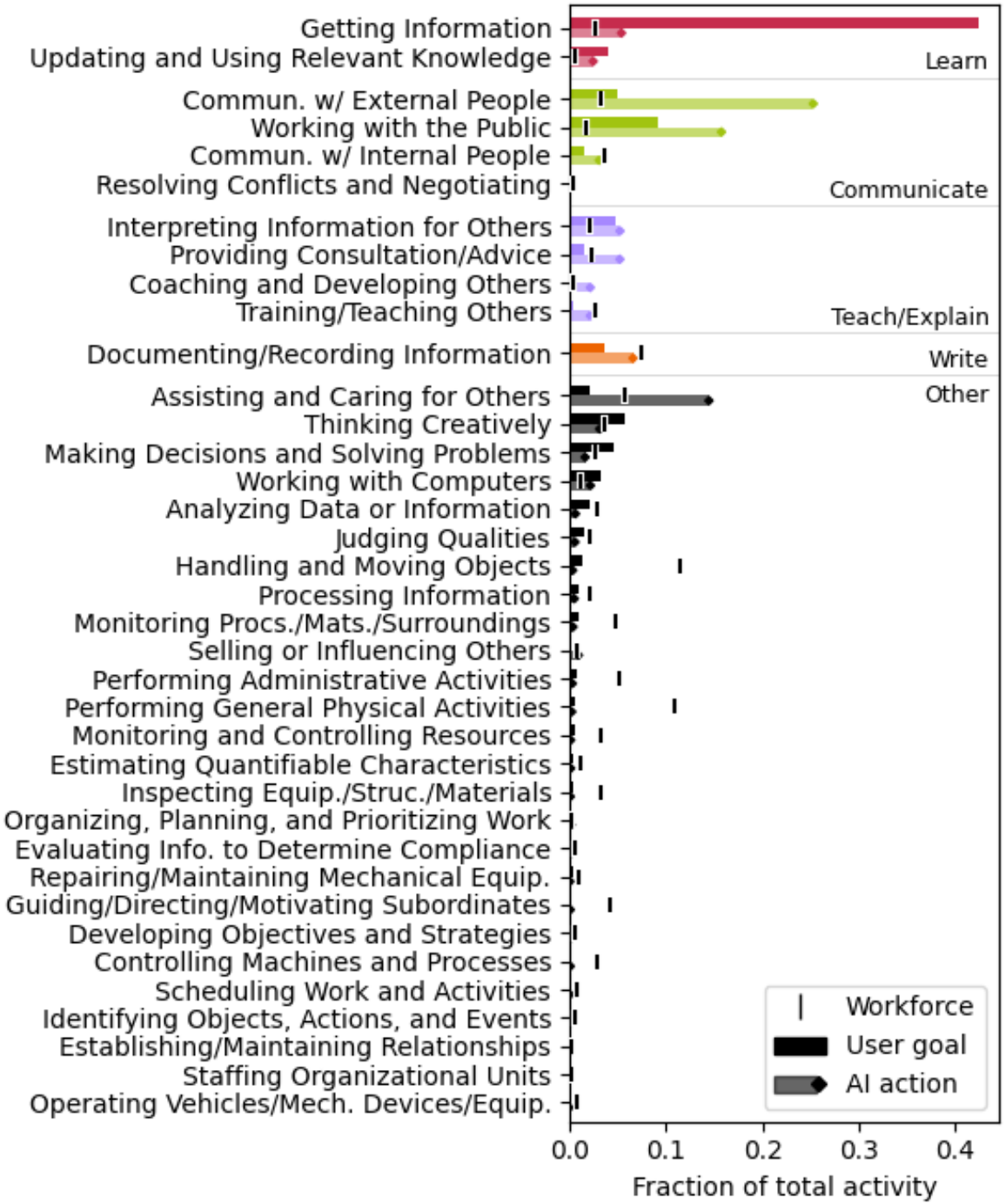
Paper: aka.ms/working-with-ai
Data: aka.ms/working-with-ai-data

Takeaways

- People primarily get AI assistance with **research and writing**, and these are the most successful tasks
  - Data analysis and image generation are also popular, but less successful
- Common AI actions include **providing information, teaching, advising**
- Overall, highest AI applicability: **knowledge work** and **communications**, especially media & communications, clerks, customer service, sales, programmers, analysts
  - Almost all occupations have at least some applicability
- Applicability largely correlated with predictions of AI impact
  - Differential applicability by wage/education are weaker than predicted due to sales and office admin jobs
  - High variance within each education / wage level

Extra slides

All GWAs


Getting Information
Updating and Using Relevant Knowledge
Learn
Commun. w/ External People
Working with the Public
Commun. w/ Internal People
Resolving Conflicts and Negotiating
Communicate
Interpreting Information for Others
Providing Consultation/Advice
Coaching and Developing Others
Training/Teaching Others
Teach/Explain
Documenting/Recording Information
Write
Other
Assisting and Caring for Others
Thinking Creatively
Making Decisions and Solving Problems
Working with Computers
Analyzing Data or Information
Judging Qualities
Handling and Moving Objects
Processing Information
Monitoring Procs./Mats./Surroundings
Selling or Influencing Others
Performing Administrative Activities
Performing General Physical Activities
Monitoring and Controlling Resources
Estimating Quantifiable Characteristics
Inspecting Equip./Struc./Materials
Organizing, Planning, and Prioritizing Work
Evaluating Info. to Determine Compliance
Repairing/Maintaining Mechanical Equip.
Guiding/Directing/Motivating Subordinates
Developing Objectives and Strategies
Controlling Machines and Processes
Scheduling Work and Activities
Identifying Objects, Actions, and Events
Establishing/Maintaining Relationships
Staffing Organizational Units
Operating Vehicles/Mech. Devices/Equip.
Workforce
User goal
AI action
0.0
0.1
0.2
0.3
0.4
Fraction of total activity

AI assistance vs AI actions

More often assisted by AI	More often performed by AI
Purchase goods or services. (118.4x)	Train others on operational procedures. (17.9x)
Execute financial transactions. (58.8x)	Train others to use equipment or products. (16.0x)
Perform athletic activities. (47.3x)	Distribute materials, supplies, or resources. (11.2x)
Obtain information about goods or services. (25.9x)	Train others on health or medical topics. (11.2x)
Research healthcare issues. (20.5x)	Provide general assistance to others. (10.9x)
Prepare foods or beverages. (14.7x)	Coach others. (10.6x)
Research technology designs or applications. (13.5x)	Provide information to clients/customers. (8.6x)
Obtain formal documentation or authorization. (12.5x)	Advise others on workplace health/safety. (7.5x)
Operate office equipment. (11.4x)	Teach academic or vocational subjects. (6.6x)
Investigate incidents or accidents. (11.3x)	Teach safety procedures or standards. (6.5x)

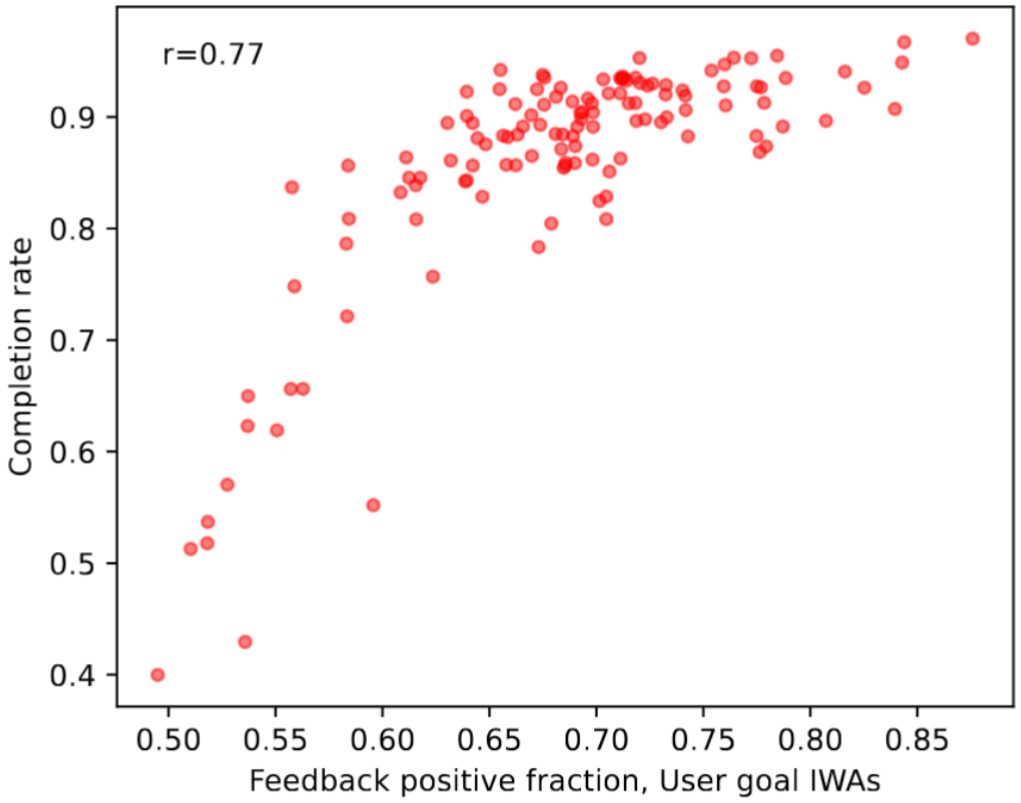
Purchasing,
Information gathering,
Physical tasks

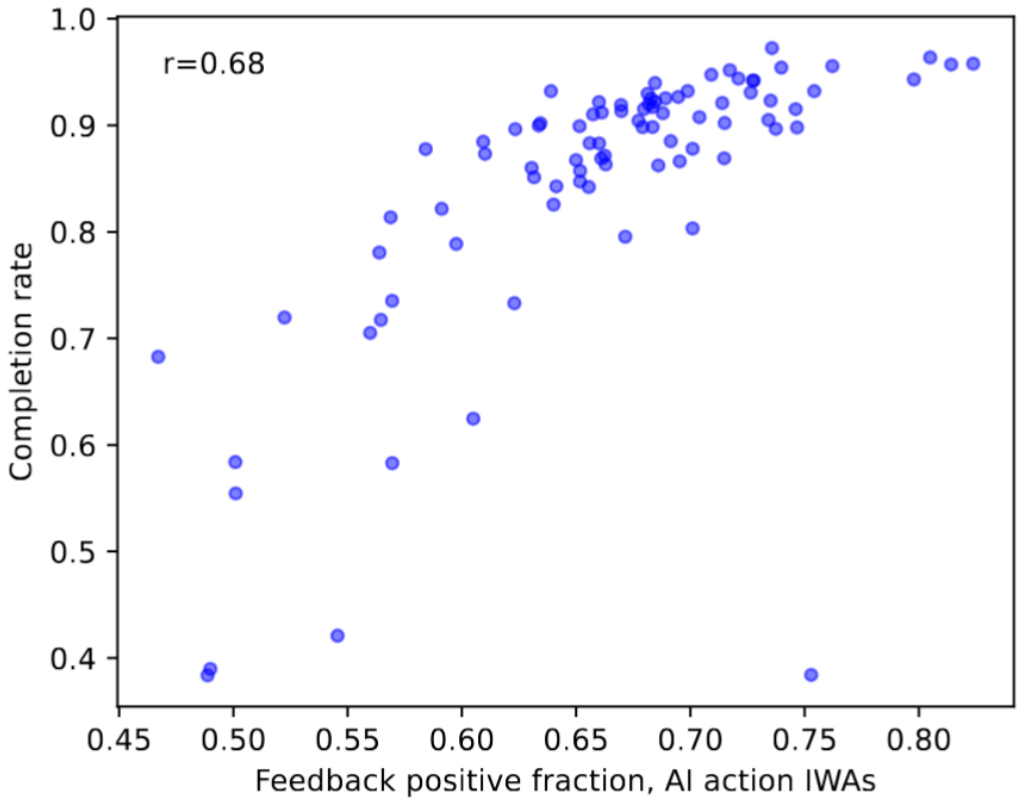
Teaching, training, advising
Assisting, informing

Completion

Is the AI chatbot is able to complete the User's task?
--not complete / partially complete / complete

Highly correlated with fraction of positive feedback





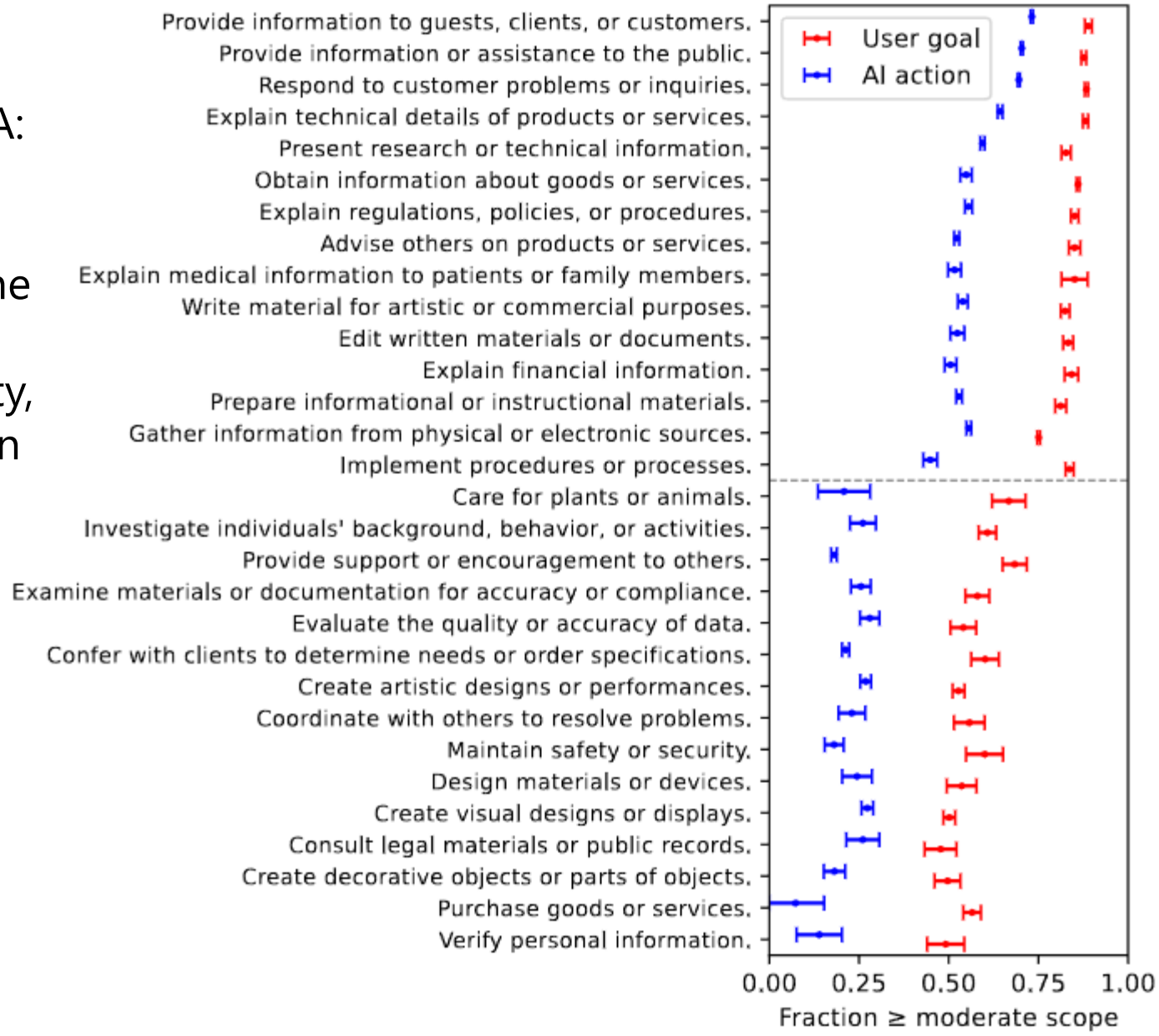
Scope

Label the bot's capability to perform the IWA:

- none: The bot does not perform the IWA,
  or
  the conversation does not indicate that the bot is capable of performing the IWA.
- minimal: With this demonstrated capability, the bot can perform a **<minimal>** portion of the work in the IWA.
- limited
- moderate
- significant
- complete

We calculate the share ≥ moderate for each IWA.

Correlated with frequency



Correlation with Current Population Survey occupation demographics