AI and the great job unbundling

A collaboration to measure granular changes in job responsibility

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AI doesn't want your job.

It just wants to change your work.

AI and the great job unbundling

Now

The economy, including technology, creates demand for different types of workers or occupations.

Next

AI and other technological advancements shape demand for specific work activities and tasks.

- With AI, job creation and destruction will be a less-important measure of labor-market health.
- The changing value of job responsibilities — those activities and tasks that make up work — will become more important.
- Which tasks are becoming more valuable? Which ones less valuable?
- AI is driving a shift in frontier research.

AI and the great job unbundling

With the rise of AI, we need a way to measure granular changes in job responsibility.

ADP Research and the Stanford Digital Economy Lab have launched a project to unbundle jobs into discrete tasks and, using ADP payroll data, assign a value to each of these job responsibilities.

When used correctly, this information can help minimize AI's negative impact on workers by helping them find the most valuable tasks within their occupations. Workers and job-seekers will know which tasks employers value most and can plan their education and careers accordingly.

Employers will have a tool for transitioning their existing teams into work that is highly valued.

What is a job?

- Jobs are bundles of work activities and tasks.
- Traditionally, labor market data and research focus on occupations.
- Given AI's applications, economists increasingly are focusing on job content – its activities and tasks.
- How is job content changing over time?
- How are bundles of activities and tasks evolving in response to AI?

The value of tasks

- ADP Research and the Stanford Digital Economy Lab are working to unbundle jobs into tasks and study the labor market in terms of these tasks.

- ADP data provides a unique opportunity to identify job tasks, and measure their quantity and valuation.

- Hedonic regression methods can be used to estimate the price of product characteristics;
  similarly, we can measure the price or value of individual work tasks.

Challenge

Defining tasks

- The U.S. Occupational Information Network (O*NET) is a Department of Labor program that provides regularly updated profiles of more than 900 occupations.
- O*NET uses a hierarchy to map work activities and occupations. This system maps:
  - 41 generalized work activities (GWAs)
  - 325 intermediate work activities (IWAs)
  - more than 2,000 detailed work activities (DWAs)
  - more than 19,000 work tasks

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The O*NET work activities hierarchy

Software developers

GWA	Thinking creatively. Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.	**GWA**	Communicating with supervisors, peers, or subordinates. Providing information to supervisors, co-workers, and subordinates by telephone, in written form, email, or in person.
IWA	Develop technical specifications for products or operations.	**IWA**	Communicate with others about specifications or project details.
DWA	Develop performance metrics or standards related to information technology.	**DWA**	Collaborate with others to determine design specifications or details.
Task	Determine system performance standards.	**Task**	Confer with systems analysts, engineers, programmers, and others to design systems and to obtain information on project limitations and capabilities, performance requirements, and interfaces.

Challenge

Extracting job tasks from job postings

- ADP data contains millions of job postings collected between 2016 and 2025.
- Natural language processing is used to extract O*NET work activities and tasks from the full text of job postings.
- Job posting text is converted to a high-dimension vector, a process known as sentence embedding, that encodes semantic meaning.
- The semantic similarity of job postings and O*NET work activity and task descriptions can be compared.

The unbundling of jobs into discrete tasks

Job posting

Position summary

EdSolutions is the industry leader in providing continuing education and compliance management solutions to the financial services industry. We are ...

Essential functions and responsibilities:

Conceptualize and design software applications per standards and development practices.

Develop products and enhance existing applications using object-oriented web development with an MVC Java application framework.

Coordinate with product management to review product definitions and requirements.

Employee must perform all of the essential functions/responsibilities with or without accommodation for classification in this position.

We are an equal opportunity employer.

1 Entity extraction

Extract job role and requirements from the job posting

2 Sentence embedding

Convert sentences into vectors that encode semantic meaning

Job posting sentences

SentID	Sentence_text
$Sent_1$	Conceptualize and design software applications per standards...
$Sent_2$	Develop products and enhance existing applications using...
$Sent_3$	Coordinate with product management to review product ...

O*NET task text description sentences

TaskID	Task_text
$Task_1$	Develop scientific or mathematical models
...	...
$Task_s$	Monitor resources

SentID	D_1	...	D_n
$Sent_1$	0.6	...	0.3
$Sent_2$	0.8	...	0.9
$Sent_3$	0.1	...	0.5

TaskID	D_1	...	D_n
$Task_1$	0.4	...	0.8
...	...	...	...
$Task_s$	0.7	...	0.6

3 Pairwise similarity

Compute similarity score for each job posting sentence with each task

SentID	$Task_1$	...	$Task_s$
$Sent_1$	0.6	...	0.7
$Sent_2$	0.9	...	0.3
$Sent_3$	0.8	...	0.5

4 Score aggregation

Aggregate over sentences to compute similarity of job posting with each task

$Task_1$	...	$Task_s$
0.9	...	0.7

Vector representation of the job posting in the O*NET Tasks space

Source: ADP Research; Stanford Digital Economy Lab

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Example: Software developers

Top work activities, Intermediate work activity (IWA)	Median	5th Percentile	95th Percentile
Develop operational or technical procedures or standards.	0.525	0.389	0.641
Develop technical specifications for products or operations.	0.522	0.408	0.635
Design computer or information systems or applications.	0.52	0.393	0.645
Respond to customer problems or inquiries.	0.507	0.382	0.646
Confer with clients to determine needs or order specifications.	0.493	0.367	0.623
Provide information to guests, clients, or customers.	0.49	0.375	0.596
Program computer systems or production equipment.	0.487	0.382	0.58
Communicate with others about specifications or project details.	0.485	0.363	0.602
Set up computer systems, networks, or other information systems.	0.476	0.385	0.564
Communicate with others about operational plans or activities.	0.473	0.339	0.586

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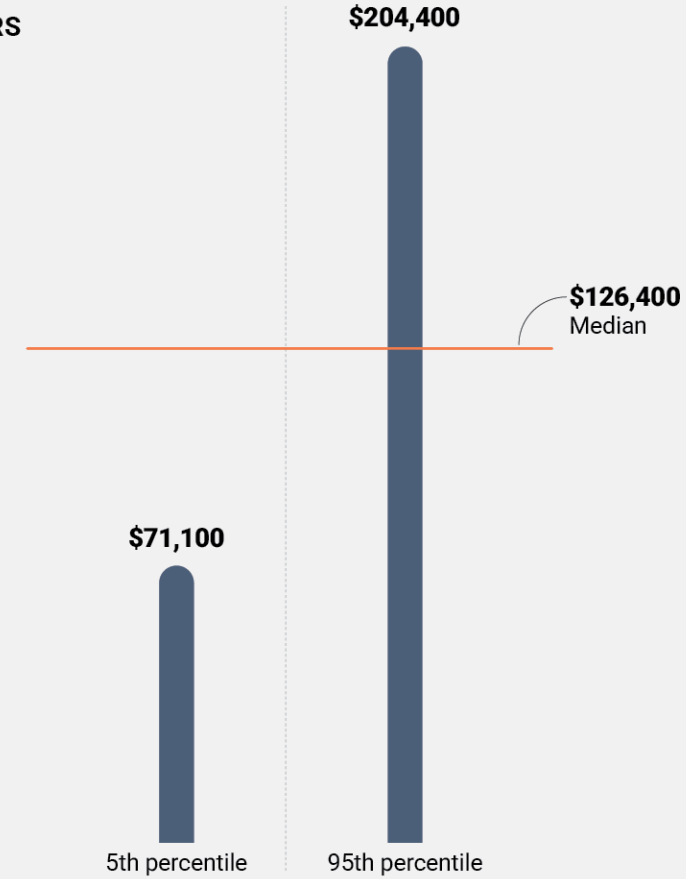
Wages for jobs and work activities/tasks

Hedonic regression can be used to estimate the determinants of wages and the valuation of job activities and tasks.

SOFTWARE DEVELOPERS

Wages of workers in jobs linked to job postings in the ADP sample.



What's next?

ADP Research and the Stanford Digital Economy Lab are collaborating to measure AI's impact on occupations and the activities that they entail.

This work will provide economists and policymakers a better understanding of labor-force supply and demand, one that is grounded not just in occupations, but in the more granular level of activities and tasks.

- Students and people new to the workforce will have more information to make decisions on education and career choices.
- Existing workers will be better informed about their career development and transition options.
- Policymakers will have better data as they set labor and economic policy.

Thank you

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