How can AI improve search and matching?
Evidence from 59 million personalized job recommendations

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Research literature on online labor market matching

Internet has changed how workers and firms search for one another

- Autor's "Wiring the Labor Market", Krueger's NYT article in 2001, and Kuhn & Skuterud in 2004
  (Stevenson 2009, Kroft & Pope 2014, Kuhn & Mansour 2014, Hjort & Poulsen 2019, Denzer et al., 2020, Gürtzgen et al., 2022 ++)

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Idea: internet shifted search to online platforms (such as, Monster, Indeed, LinkedIn, Glassdoor)

1. reducing amount of search frictions: contact rates $\uparrow$
2. lowering costs of search and recruitment: search intensity $\uparrow$

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- Belot, Muller, Kirchner 2019, 2022, Marinescu & Wolthoff, 2020

  $\longrightarrow$ potentially reinforcing 1+2, possibly mitigating congestion problem 3

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Can we engineer recommendation systems to get people back to work and fill vacant positions?

Why We Care and the Most Closely Related Work

Well-established fact: search is concentrated in own occupation and location

- concern that congestion lowers employment: mainly addressed through quantitative exercises
  (e.g., Nickell 1982, Sahin, Topa, Song, Violante 2014, Patterson, Sahin, Topa, Vionlante 2016, Marinescu & Rathelot 2017)
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Providing Advice to Jobseekers at Low Cost: An Experimental Study on Online Advice
by Belot, Muller, Kircher (Review of Economic Studies 2019)

- use theory to design automated job search assistance system
  – recommendations from job flows and ONet-similarities + visualizing labor market tightness
- combined w/ lab-in-the-field experiment (N=300) and survey of activities & outcomes

  $\longrightarrow$ advice causes search $\leftrightarrow$, interviews $\uparrow$, imprecise impacts on employment

Questions from BKM and The Contributions of This Paper (LBHR)

Questions from BKM:

- what conclusions are missed due to lack of statistical power?
- do higher job finding rates come at the cost of lower match-quality?
- how do recommendations and broadening search affect (aggregate) congestion?

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- partnered w/ Sweden's employment agency: filtering clicks + two-sided experiment
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Main contributions: first large-scale evaluation of a recommendation system

- filling gaps from BKM: statistical power, exploring congestion and match quality
- expanding by offering first evidence on effects of recommendations for vacancy outcomes

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Potential scope: understanding how recommendation system can be used for market design

(connecting paper closer to the discussion of Milgrom & Tadelis 2019)

Trends: AI and Labor Market Matching

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Amazon defines AI: dedicated to solving cognitive problems commonly associated with human intelligence, such as learning, problem solving, and pattern recognition.

OECD (2023) document increasing use of AI in labor market matching

- writing job descriptions, applicant sourcing, analyzing CVs
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Adoption of AI tools for labor market matching among large employers

- 40% of HR functions of international companies from around the world say they are currently using AI for applications
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$\longrightarrow$ worth examining whether effects are stronger among small firms, who get AI for free?

Industry: AI on Job Platforms in the US

Hello, what would you like to explore today?

For Employers | Post Jobs

Jobs | Companies | Salaries | Careers

andreas.r.kostol@gmail.com

Assistant Professor

Tempe, AZ (US)

Getting the Most of Your Glassdoor

Shining a Light on Equity

Jobs Recommended for You

Recommendations are based on your **profile**, **job preferences**, and activity on Glassdoor.

Harkins Theatres
Santan Village 16 - Team Member
3.6 ★ Gilbert, AZ
$32K - $41K (Glassdoor Est.)
9d

Harkins Theatres
Queen Creek - Team Member
3.6 ★ Queen Creek, AZ
$31K - $40K (Glassdoor Est.)
9d

Pizza Hut
Team Member
3.5 ★ Mesa, AZ
$14 - $15 Per Hour (Employer Est.)
Easy Apply 1d

Torchy's Tacos
Front of House Team Member - New Restaurant Opening
3.7 ★ Gilbert, AZ
$20 - $20 Per Hour (Employer Est.)
Easy Apply 89d

See all jobs >

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Potential for growth of AI in labor market matching?

- use of large language model for experimentation and ad targeting

Exploratory vs. Specific Search

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- exploratory phases of the search process, then offering some breadth will help [...] learn their tastes and the options available
- [...] driven to [sell] something particular, offering a narrower set of [buyers] that match the [worker's skills and] preferences would be better

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Does Platsbanken-algo pick up differential intent of young vs. long-tenured?

Relatedly, authors explore match quality effects but find little effects – on average

- worth exploring differential match quality effects among non- vs. specialized workers?

Questions: Missed Opportunities for Market Design?

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...risk of collaborative-filtering recommender system is [...] recommend to many users the same popular item [...thereby exacerbating] congestion. To control that risk, we filter out from the recommendation sets vacancies that received more than 200 clicks over the training period (around 15% of the most popular vacancies).

- BKM (and LinkedIn) includes tightness in recommendations
- missed opportunity to learn about AI's ability to solve a problem?

Maybe next round of experiments can include the number of clicks / applications?

Final Remarks + Offline Material

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1. Does the recommendation system reduce mismatch (in VU-ratios)?
2. No creation responses from firm-level vacancy-recommendations. What about market-level responses using super-controls?
3. What about other search channels? BML find reallocation to be important.
4. Why clicks and not flows? What is the advantage of not only focussing on occupational flow / characteristics?
5. Personalized rather than occupational-specific recommendations: how much more personal is it with 128 types vs. 300 occupations?