VADORE
VAlorizations of Data to imprOve matching in the laboR markEt

ENSAE − Univ. Paris-Sud − Pole Emploi

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VADORE project

Objectives

- Reduction in frictional unemployment
- Recommendation of vacancies to job seekers / job seekers to firms
- Empowerment of job seekers and recruiters

Partners

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Frictional unemployment

Substantial **frictions** in the french labor market (200-330m unfilled vacancies)

- Imperfect information: cost of access to information, processing and dissemination of information
- Asymmetric information between job seekers (JS) and recruiters
- Limited ability of JS to consider and sort a large volume of vacancies

What we know about Public Employment Services

- Job search assistance programs are effective   Card 15
- Symmetric intervention recommendation to firms   Algan et al. 17

Room for improvement

- Recent use of recommendation algorithms on labor market platforms
                                                  Horton 15-17; Schmidt et al. 17
- Questions:
  - Use of very detailed set of longitudinal data to conceive recommendation and empowering tools
  - Use of the tools at a large (national) scale
  - Measure of impacts at the individual level (transition to employment - hires) and at the market level (displacement and crowding out effects)

Available (big) Data

Applicants

- Demographic variables collected at each registration into unemployment
- Detailed information on past unemployment spells, reasons for being unemployed
- Parameters of the jobsearch (reservation wage...)
- Large database of CVs (30M): Education, training, skills, experience, description of past occupations, fields of interest, hobbies

Enterprises

- All past vacancies posted at the PES - detailed information on job offers (3.2M posted in 2017)
- Past flows of hires by occupation/contract
- Accounting information

Matching

- Database recording tentative matching (MER) and successful matching (MER+)
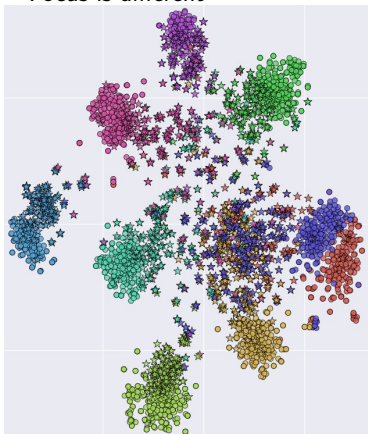- Database recording all hires for firm - individual pair

Labor market

- Labor market tightness measures at a local/trade level

Challenges

Text processing (CVs, offers)

- Vocabulary is different
- Focus is different

Similarity between offers (circle) and CVs (stars)

Resources, e.g. ROME work market ontology

- New competences and new jobs are not considered.
- Job seekers can fit in various categories (receptionist vs saleswoman).

Goal 1: recommendation

Collaborative filtering

- Learn the best match from the past   Challenge Netflix
- Limit: Cold start (new users, new items)

Word Embedding

- From words to $\mathbb{R}^d$
- Alignment of job and offer vocabularies in $\mathbb{R}^d$ Rolet Cuturi Peyré 16
- Siamese networks to improve text similarity from collaborative similarity
                                                          Schmitt et al. 17

Goal 2: Empowerment
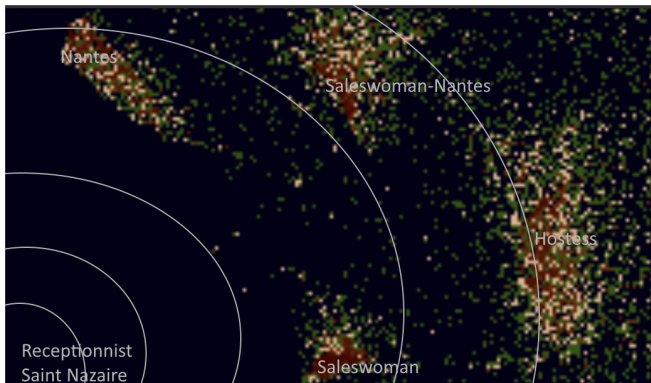
Sub-market map of job offers/CVs

- ▶ Where can I find jobs ? What kind of jobs?
- ▶ Density, Evolution, Wages,...

"what-if" Scenario

- ▶ What should I change to find jobs ?

Validation and Impact Evaluation

Randomized Experiments

- Two new tools : recommendations and the map
- A/B Testing: provide access to the tools to randomly selected set of job seekers / firms *vs* control groups

Questions

- How the tools are used
- Direct Impact of using tools (flows of hires/transition to employment)
- Specific design to address equilibrium effects and crowding out effects (inequalities in the access to employment)

Crépon 13

Planning

- Phase I September 2018 - August 2019
  - Data preparation (Ing.)
  - recommendation algorithms

- Phase II September 2019 - February 2020
  - recommendation tools finalized and incorporated in PES caseworkers toolbox
  - Empowerment map

- Phase III March 2020 - August 2020
  - AB testing of recommendation system
  - Empowerment map finalized and incorporated in caseworkers toolbox

- Phase IV September 2020 - February 2021
  - AB testing of the recommendation system, update
  - AB testing empowerment map
  - Equilibrium effects of recommendation tools (Impact on inequalities in access to employment)

- Phase V March 2021 - September 2021
  - Equilibrium effects of recommendation tools (Impact on inequalities in access to employment)
  - Equilibrium effects of empowerment map (Impact on inequalities in access to employment)