What a Billion Jobs Can Tell Us

Real-Time Data in the Labour Market

Davor Miskulin, Head of International Business Development
Burning Glass Technologies
ETF and EC Workshop about Skills Matching and Anticipation- Milan
June, 2019
Applying Big Data to the Economy: The Billion Prices Project

The insight was simple: the Internet provides vast amounts of real-time economic data—if you can collect and analyze it.

Provided a reality check to official stats in Argentina.

Serves as a model for the kind of insight Internet data can empower.
What a Billion Jobs Can Tell Us vs. Traditional Labour Market Information

Greater speed, granularity compared to surveys

Because of that speed and detail, the data is more actionable

In addition, job postings provide insight into real-world skill demands
The Process: Collecting Real-Time Labour Market Data

Visit Online Job Sites

Collect & Deduplicate Job Postings

Tagging & Normalising Postings to Generate Detailed Data

- Job Title & Occupation
- Employer & Industry
- Technical Skills
- Foundational Skills
- Certifications
- Educational Requirements
- Experience Levels
- Salaries
What it Takes: Collection Infrastructure

The effort needed to build a comprehensive data collection structure is significant, as our experience shows.

- **3.4 million**
  Active jobs collected weekly

- **40,000**
  Sources across the web - job boards and corporate sites

- **>1 million**
  Firms represented, from large corporations to SME’s in the US, UK, CA, ANZ, SG

- **80%**
  Deduplication ensuring integrity and consistency

- **300 million**
  CV’s processed per annum

- **1 billion**
  Historical job market records

**Dynamic Labour Market Ontology**

- 23 Career Areas
- 2,000 Occupations
- 18,000 Skills
- 60,000 Skill Variants
Job Posting Data Correlates With Other Sources

Figure 5: JOLTS and Burning Glass Data
(January 2010-April 2017)

Correlation of the two time series is 0.89

Note: Burning Glass data cannot be directly compared to JOLTS, because of the differences in the collection method. Burning Glass data represent only new postings which are collected for a specific month, while JOTLS data includes openings which could have also existed in previous months.
What This Data Can Tell Us
Real-time Data Examines the DNA of Jobs

• Jobs are bundles of skills
• Traditionally, we’ve understood those skills via expert analysis
• But job posting data allows us to see how jobs bundle and unbundle skills in the real world, in real time
Core Skills: Definitional skills to each occupation which job seekers need in order to contribute.

Building Block Skills: Required and relevant across many roles and represent foundational, but not unique skills.

Distinguishing Skills: These are the core specializations and differentiations that drive performance – and often time and cost to hire.
Jobs are Mutating
The Emergence of a Hybrid Genome

Accountant

ACCOUNTING
Accounting
Account Reconciliation
General Ledger
Financial Statements
Generally Accepted Accounting Principles
Financial Reporting
Balance Sheets

SOFTWARE SKILLS
Communication Skills
Detail-oriented
Excel

+23%
Since 2013

Data Scientist

PROGRAMMING
Python
SQL
Hadoop
R

DATA SKILLS
Data Visualization
Tableau
Excel
MapReduce

BUSINESS SKILLS
Predictive Models
Business Process
Economics
Strategic Planning

SOFTWARE SKILLS
Problem Solving
Writing
Teamwork

+598%
Since 2013
Posting Data Shows
How Existing Occupations Can Evolve Dramatically in Just a Few Years

Fastest-Changing Professional Occupations

- Mechanical Drafters: 40%
- Computer Programmers: 36%
- Architectural and Civil Drafters: 34%
- Software Developers, Systems Software: 30%
- Advertising and Promotions Managers: 28%
- Pharmacists: 28%
- Insurance Underwriters: 28%
- Environmental Engineers: 28%
- Electrical and Electronics Drafters: 27%
- Actuaries: 24%

% of tasks that have changed since 2007

Source: Deming, NBER, 2018, analysing Burning Glass data
Hybrid skills are redefining the market

**A key trend** is jobs that combine skills from different fields, such as technology and marketing, or product management and data analytics.

- **Web Development and Design**
  - Job Count: 67,250
  - Last 12 Months
  - Change Since 2011: 3%
  - Average Salary: $87,217

- **Digital Marketing and Marketing Automation**
  - Job Count: 45,991
  - Last 12 Months
  - Change Since 2011: 145%
  - Average Salary: $76,783

- **Project Management**
  - Job Count: 40,752
  - Last 12 Months
  - Change Since 2011: 7%
  - Average Salary: $106,471

- **User Experience / User Interface (UI/UX)**
  - Job Count: 29,825
  - Last 12 Months
  - Change Since 2011: 15%
  - Average Salary: $99,177

- **Mobile Development**
  - Job Count: 41,032
  - Last 12 Months
  - Change Since 2011: 135%
  - Average Salary: $111,380

- **Data Analytics**
  - Job Count: 41,000
  - Last 12 Months
  - Change Since 2011: 372%
  - Average Salary: $105,540

Source: [Burning Glass: Hybrid Jobs Report](#)
Soft Skills Matter: And employers struggle to fill them

Source: Human Factor
Jobs That Mix Skills are Growing Fastest

Harvard economist David Deming: Jobs requiring a combination of math and social skills are growing fastest.

Source: Jobs of the Future
# Identifying Future Skill Demands Using the Data

<table>
<thead>
<tr>
<th></th>
<th>Top IT Skills (Total postings)</th>
<th>Highest Paying IT Skills (Mean advertised salary)</th>
<th>Fastest Growing IT Skills (24 month projections)</th>
<th>Hardest to Fill IT Skills (Mean posting duration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SQL</td>
<td>Zookeeper</td>
<td>TensorFlow</td>
<td>Public Cloud Security</td>
</tr>
<tr>
<td>2.</td>
<td>Java</td>
<td>TensorFlow</td>
<td>General Data Protection Regulation (GDPR)</td>
<td>Infrastructure as a Service (IaaS)</td>
</tr>
<tr>
<td>3.</td>
<td>JavaScript</td>
<td>Scala</td>
<td>Kubernetes</td>
<td>Cloud Technology Architecture</td>
</tr>
<tr>
<td>4.</td>
<td>Linux</td>
<td>AWS Redshift</td>
<td>Spring Boot</td>
<td>Cloud Infrastructure</td>
</tr>
<tr>
<td>5.</td>
<td>Python</td>
<td>AWS DynamoDB</td>
<td>Webpack</td>
<td>Ansible</td>
</tr>
<tr>
<td>6.</td>
<td>Data Analytics</td>
<td>Go Programming Language (Golang)</td>
<td>AWS Lambda</td>
<td>Apache Mesos</td>
</tr>
<tr>
<td>7.</td>
<td>Salesforce</td>
<td>Pig</td>
<td>Salesforce Lightning</td>
<td>Data Protection Planning</td>
</tr>
<tr>
<td>8.</td>
<td>C#</td>
<td>Apache Mesos</td>
<td>Redux</td>
<td>Work Breakdown Structure</td>
</tr>
<tr>
<td>9.</td>
<td>Scrum</td>
<td>AWS CloudFormation</td>
<td>Financial Microservices</td>
<td>Hadoop Cloudera</td>
</tr>
<tr>
<td>10.</td>
<td>C++</td>
<td>Deep Learning</td>
<td>Apache Kafka</td>
<td>OpenShift</td>
</tr>
</tbody>
</table>
The Retail industry, which to a large extent represents the consumers of AR/VR, has shown increasingly fast growth in demand after 2015.

Examples of growing demand for AR/VR in occupations:
- Video Game Designer
- Hardware Engineer
- Marketing Manager
- Product Manager
- Market Research Analyst
- Mobile Applications Developer
For new entrants: Highlight skills critical for workforce success

Welder / Solderer

- Forklift Operation
- Band Saw
- Calipers
- Hand Tools
- Measuring Tape
- Power Tools

Occupation Profile

Welder / Solderer: Uses welding equipment to solder or heat and bind pieces of metal together.

Common job titles include:
- Welder
- MIG Welder
- Welder Fabricator
- TIG Welder
- Pipe Welder

<table>
<thead>
<tr>
<th>National Postings</th>
<th>% BA</th>
<th>% Entry Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>34,208</td>
<td>0%</td>
<td>31%</td>
</tr>
</tbody>
</table>

Welding
- MIG and TIG Welding
- Flux Core Welding
- Gas Metal Arc Welding (GMAW)
- Pipe Welding
- Gas-Tungsten Arc Welding (GTAW)
- Arc Welding
- Shielded Metal Arc Welding (SMAW)
- Soldering
- Spot Welding
- Stick Welding
- Welding Equipment

Machining & Manufacturing Technology

- Blueprints
- Computer Numerical Control (CNC)
- Drill Presses
- Grinders
- Lathes
- Machining
- Robotics

Employability Skills:
- Mathematics
- Communication Skills
- English
- Detail-Oriented
- Organizational Skills
- Troubleshooting
- Quality Assurance and Control

*Italicized skills* indicate those that are defining to the roles
*Bolded skills* indicate those that make a job more difficult to fill.
Skill-based Career Pathways

- Understand career progression based on skill adjacency to retain and promote mobility
- Align occupations to realities of the labor market so employees understand the impact of their career progression

Cybersecurity Analyst

- Top Skills Requested:
  1. Information Security
  2. Information Systems
  3. LINUX
  4. Network Security
  5. Security Operations
  6. Cryptography
  7. Scanners
  8. Project Management
  9. UNIX

- Total Job Openings: 19,017

- Requested Education (%):
  - Sub-BA
  - Bachelor/Graduate Degree

- Top Certifications Requested:
  - GIAC
  - CISA
  - CISM
  - Security+
  - Cisco Certified Network Associate

Source: [www.cyberseek.org](http://www.cyberseek.org)
Reskilling to Survive Automation
Identifying Options for Workers at Risk

- Machinist: $40,095, -7% decline
- Data Entry Clerk: $27,076, -7% decline
- CNC Programmer: $54,506, +8% growth
- Medical Biller: $32,761, +12% growth

Skills:
- Machinist: CAD/CAM, Manufacturing Processes, AutoCAD, Mastercam, SolidWorks
- Data Entry Clerk: Medical Billing, HIPPA, ICD-10, CPT Coding
- CNC Programmer: 
- Medical Biller:
How Real-Time Data Inform Policy & Programs

With more detailed insight, agencies can respond more precisely and use resources more effectively

A complement, not substitute for traditional LMI

Traditional LMI still vital for long-term, macroeconomic trend analysis
Davor Miskulin

dmiskulin@burning-glass.com
@dvmis
@Burning_Glass