



**Job Outlook Index (JOI)
Technical Document**

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Executive Summary

Traditionally, job outlook has been presented as a dichotomous indicator of either being “bright” or “not bright,” and not addressing the problem of jobs being threatened by automation. PAIRIN has recognized this problem and developed the Job Outlook Index (JOI). The JOI is constructed from the three main data elements:

- **Projected Annual Job Openings** *(The projected number of job openings in a given time period)*
- **Projected Percent Employment Change** *(The percentage increase or decrease in the number of job openings from the previous year)*
- **Automation Potential** *(The percentage of job tasks in a given job that can be done by an automated method; jobs with high automation potential may be considered at risk)*

For each job, these data elements are standardized and placed on a 1-100 scale, where a lower number indicates a low or unfavorable job outlook (fewer job openings and a higher chance of automation), and a higher number indicates a high or favorable job outlook (more job openings and less chance of automation).

Initially, the JOI produced the job outlook for occupations only at a national level. However, a great deal of variability in Bright Outlook data can exist between US states. A job may be as easy to automate in Colorado as in New York, but there can be great variability in Projected Annual Job Openings and Projected Percent Employment Change due to state-based labor market differences. Thus, state-level JOIs can be calculated using the same processes as national JOI, by using state-level BLS data instead of national-level BLS data. This can yield more accurate information for job seekers and policymakers in each US state and territory.

PAIRIN created a state-specific data visualization tool for the JOI and implemented the Florida specific data in the Education Meets Opportunity Platform (EMOP).

The EMOP version of the tool presents data on each one of the data elements that construct the JOI.

If you have any questions, concerns, or suggestions, please contact the PAIRIN team at support@pairin.com.



Background

Traditionally, job outlook has been presented as a dichotomous variable. That is, a specific job is either a Bright Outlook job or it is not. However, the presentation of this information does not provide any insight as to the degree of the outlook for the job. If one thinks of “bright” in terms of a light source, the current method truly only denotes whether the light source is shining or not, it doesn’t tell a person how bright the light source is. Thus, the current method of presenting bright outlook designation doesn’t yield as much actionable information about whether or not a job is of interest to job seekers or policymakers. Additionally, because of the rapidly changing nature of the technological advancements in the world of work, there is no indication of how vulnerable certain jobs or entire career paths may be to potential automation. For these reasons, PAIRIN researched and developed the PAIRIN Job Outlook Index (JOI) to respond to these needs.

Data sources

Bright Outlook jobs are reported by the Bureau of Labor Statistics (BLS) using two criteria:

- **Projected Annual Job Openings**
- **Projected Percent Employment Change.**

Additionally, a threshold is applied to these criteria to determine if a job is considered “Bright Outlook.”

The original job vulnerability data was researched and presented by the Brookings Institute. This research examined all job tasks to determine whether or not the task in question could be automated through robotics, artificial intelligence, or some other method. After analyzing all tasks, the resulting percentage that can be automated in an individual job represents the degree of vulnerability to automation for that job. Job vulnerability data can also be used to predict what sort of effect automation may have on the jobs in question. Some jobs may expect no or very few changes to them. Others may end up with new tools, some job transformation, or even job reduction. Other jobs may be entirely eliminated by automation or technological advances.



The following chart represents how jobs may be affected by automation and job vulnerability.

Fish and Game Wardens	Highway Workers	Musical Instrument Repair	TSA Screeners	Ophthalmic Lab Technicians
				
3.5% automatable	28% automatable	50.3% automatable	74.2% automatable	100% automatable
Very few changes	Some changes	Several changes	Considerable changes	Extreme changes
Some new tools	New tools; some job transformation	New tools, considerable job transformation	Considerable job transformation and some job reduction	Job reduction and/or job elimination

By using all of these data sources together, job seekers or policymakers can gain powerful knowledge about individual jobs and career paths. For instance, a job could be considered a Bright Outlook job because of short-range needs in the labor market and potential elimination due to automation in the next 5-10 years.

Construction of the JOI

The JOI is constructed from the three main data elements:

- **Projected Annual Job Openings** *(The projected number of job openings in a given time period)*
- **Projected Percent Employment Change** *(The percentage increase or decrease in the number of job openings from the previous year)*
- **Automation Potential** *(The percentage of job tasks in a given job that can be done by an automated method; jobs with high automation potential may be considered at risk)*



Each data element is a continuous variable but is on a different scale, so some measure of conversion is necessary to be able to combine them into a single index of job outlook.

- **Step 1 - Since automation potential is shown in the opposite direction of the other two data sources, automation potential is inverted** (*i.e. low automation potential is qualitatively “good” versus the other two data elements which would be qualitatively “bad” if they were low*).
- **Step 2 - All three data elements are standardized into Z-Scores** using means and standard deviations related to the total of all jobs in consideration.
- **Step 3 - The two standardized “Bright Outlook” variables are averaged and then applied to a norm distribution to express them as a percentile ranking, ultimately generating a number between 1 and 100.** This provides a discrete variable related to Bright Outlook that delivers information about the degree of brightness which may be compared to the overall PAIRIN JOI.
- **Step 4 - All three standardized data elements are averaged and then applied to a norm distribution to express them as a percentile ranking, ultimately generating a number between 1 and 100.** This provides a discrete variable related to both Bright Outlook and Job Vulnerability.

National versus state-level JOI

Initially, the JOI produced the job outlook for occupations only at a national level. However, there can be a great deal of variability in Bright Outlook data between US states. A job may be as easy to automate in Colorado as in New York, there can be great variability in Projected Annual Job Openings and Projected Percent Employment Change due to state-based labor market differences. Thus, state-level JOIs can be calculated using the same processes outlined above, by using state-level BLS data instead of national-level BLS data. This yields more accurate information for job seekers and policymakers in each US state and territory.

The EMOP implementation of the JOI will be updated as new data becomes available. It is a useful indicator for sorting in demand occupations by the outlook of those jobs.

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