# A Demonstration of OES Web-Based Chart and Map Visualization Tools

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BUREAU OF LABOR STATISTICS
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# Outline

- Overview of OES survey

- Challenges of creating visuals

- Demonstration of products

- Research into future developments

# Occupational Employment Statistics

- Employment and wage estimates for over 800 occupations

- Estimates published annually with May reference date

- Cooperative effort between BLS and 50+ state workforce agencies

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# Example of Three-Year Methodology

- Estimates with May 2012 reference date produced with the following panels:

  - May 2012
  - November 2011
  - May 2011
  - November 2010
  - May 2010
  - November 2009

  Approximately 200,000 units each; total 1.2 million

- Each year, two oldest panels drop off and two new ones are added

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# Coverage and Classification

- SOC – Occupations :

  **23 Major occupation groups**

  **97 Minor occupation groups**

  **461 Broad occupations**

  **840 Detailed occupations**

- NAICS – Industries
  - ▶ 2,3,4, and some 5 and 6-digit levels
  - ▶ (Broadest → narrowest scope)

# 2010 SOC Occupational Hierarchy

**Major group**     **15-0000 Computer and Mathematical Occupations**

**Minor group**     **15-2000 Mathematical Science Occupations**

**Broad occupation**     **15-2040 Statisticians**
This broad occupation is the same as the detailed occupation 15-2041 Statisticians.

**Detailed occupation**     **15-2041 Statisticians**
Engage in the development of mathematical theory or apply statistical theory and methods to collect, organize, interpret, and summarize numerical data to provide usable information. May specialize in fields, such as bio-statistics, agricultural statistics, business statistics, economic statistics, or other fields. Include mathematical statisticians.

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# Estimates Produced

- **OES Data 1997 – 2012**

- Cross-industry by geographic area
  - U.S.
  - State
  - MSA / Non-MSA

- Industry-specific
  - U.S.
  - States (Research Data)

- By ownership (public/private):
  - U.S. only

# **Visualization Challenges**

- Large amount of data

- Survey limitations

- Limited resources

- Diverse user base

# Data Available in <u>Charts</u>

- For a particular area:
  - ▶ Occupations with highest employment
  - ▶ Occupations with highest location quotients (LQs)

- For a particular industry:
  - ▶ Occupations with highest employment

- For a particular occupation:
  - ▶ Areas with highest employment
  - ▶ Areas with highest LQs
  - ▶ Industries with highest employment
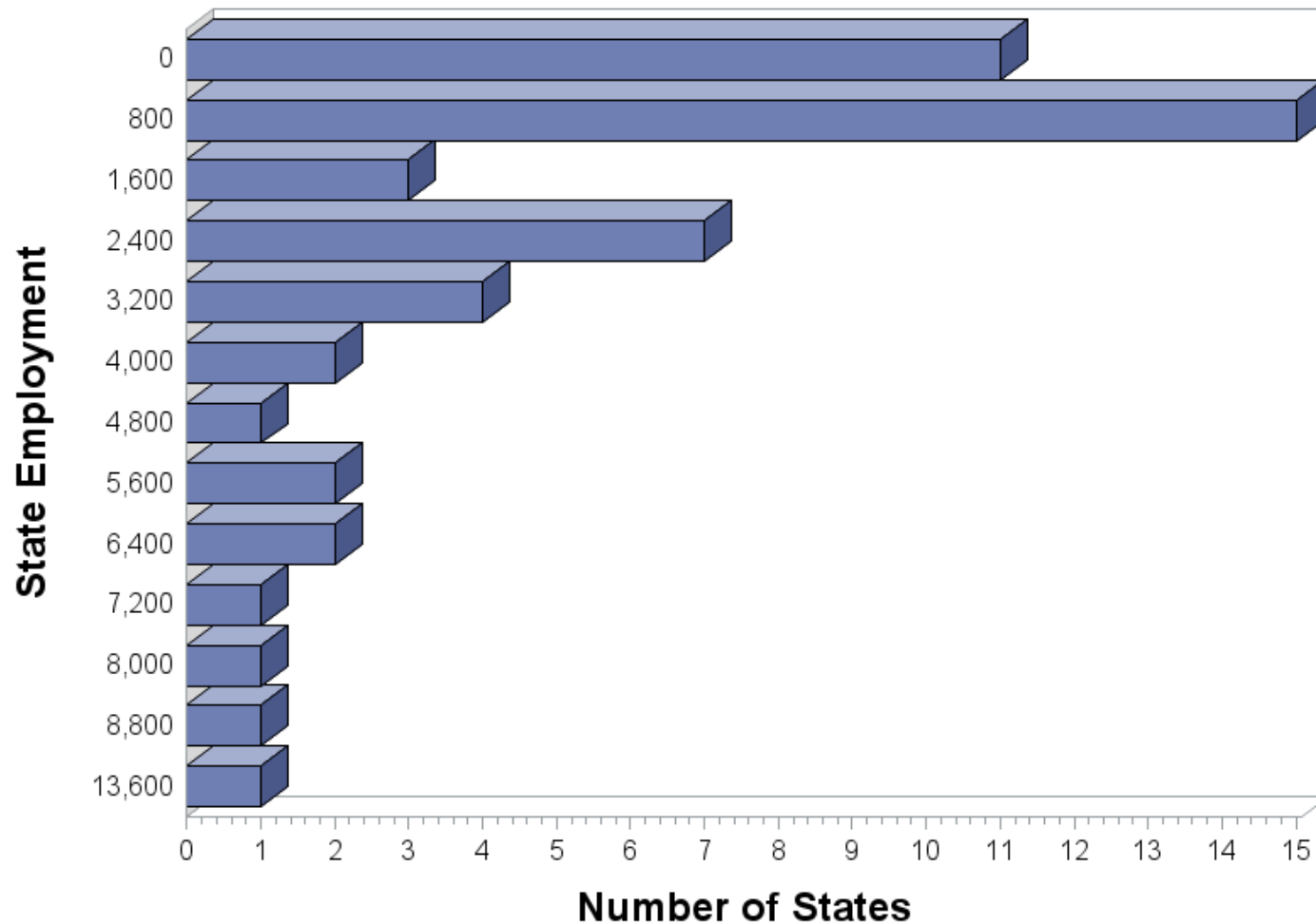
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# Data Available in **Maps**

- Employment estimates

- Annual mean wage estimates

- Location Quotients

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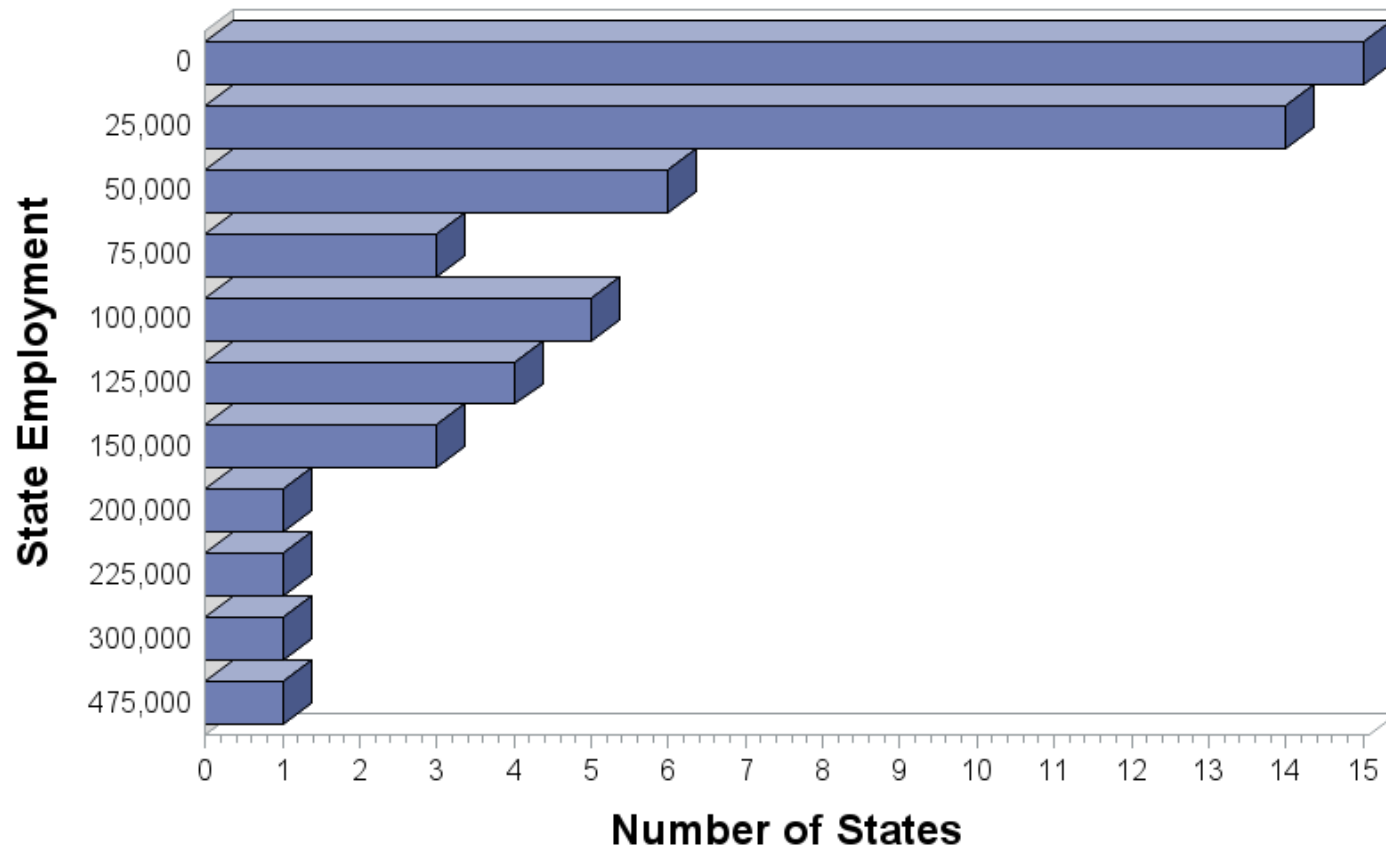# Distribution – detailed occ
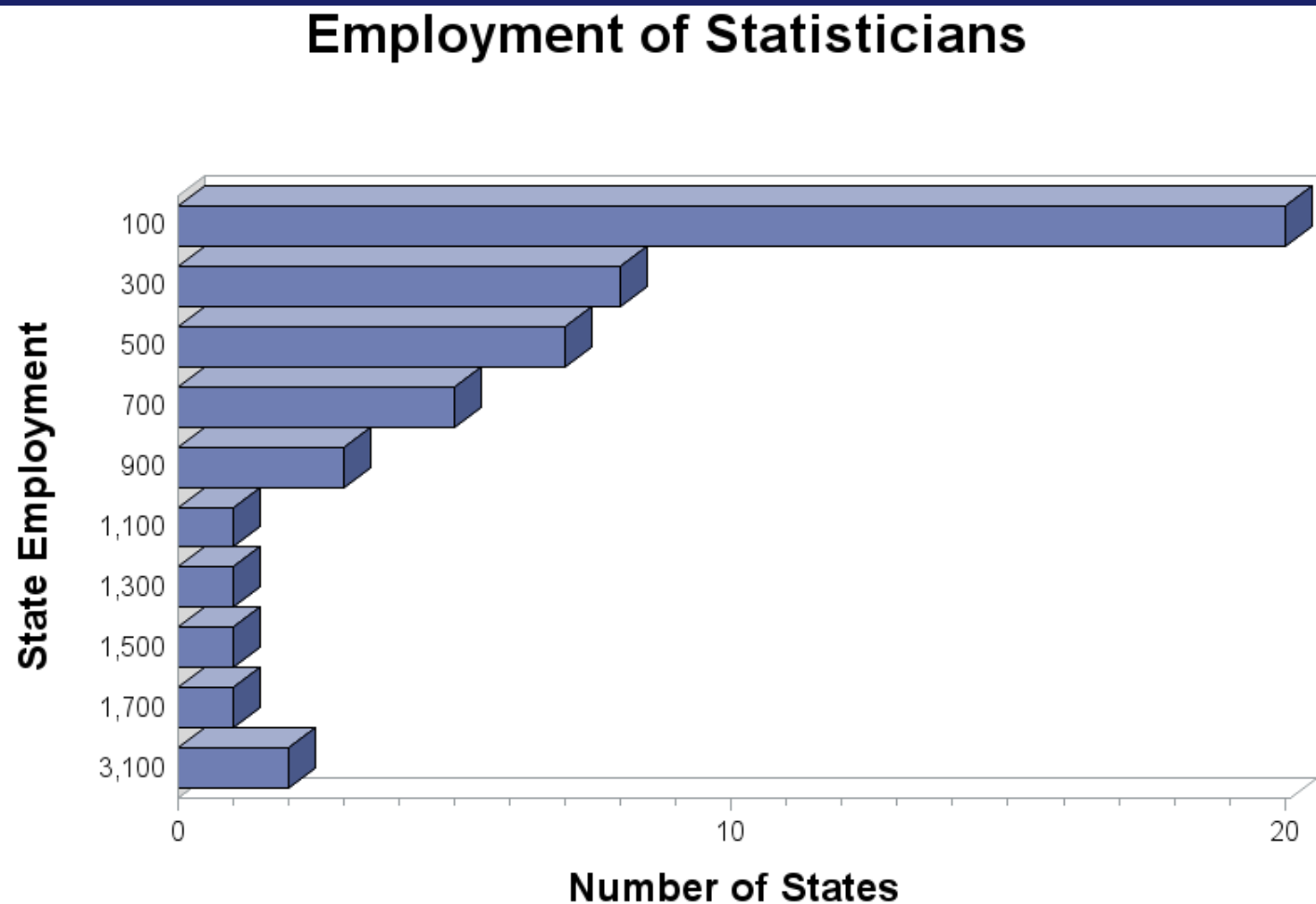
# Distribution – minor occ



Employment of Mathematical Science Occupations

# Distribution – major occ



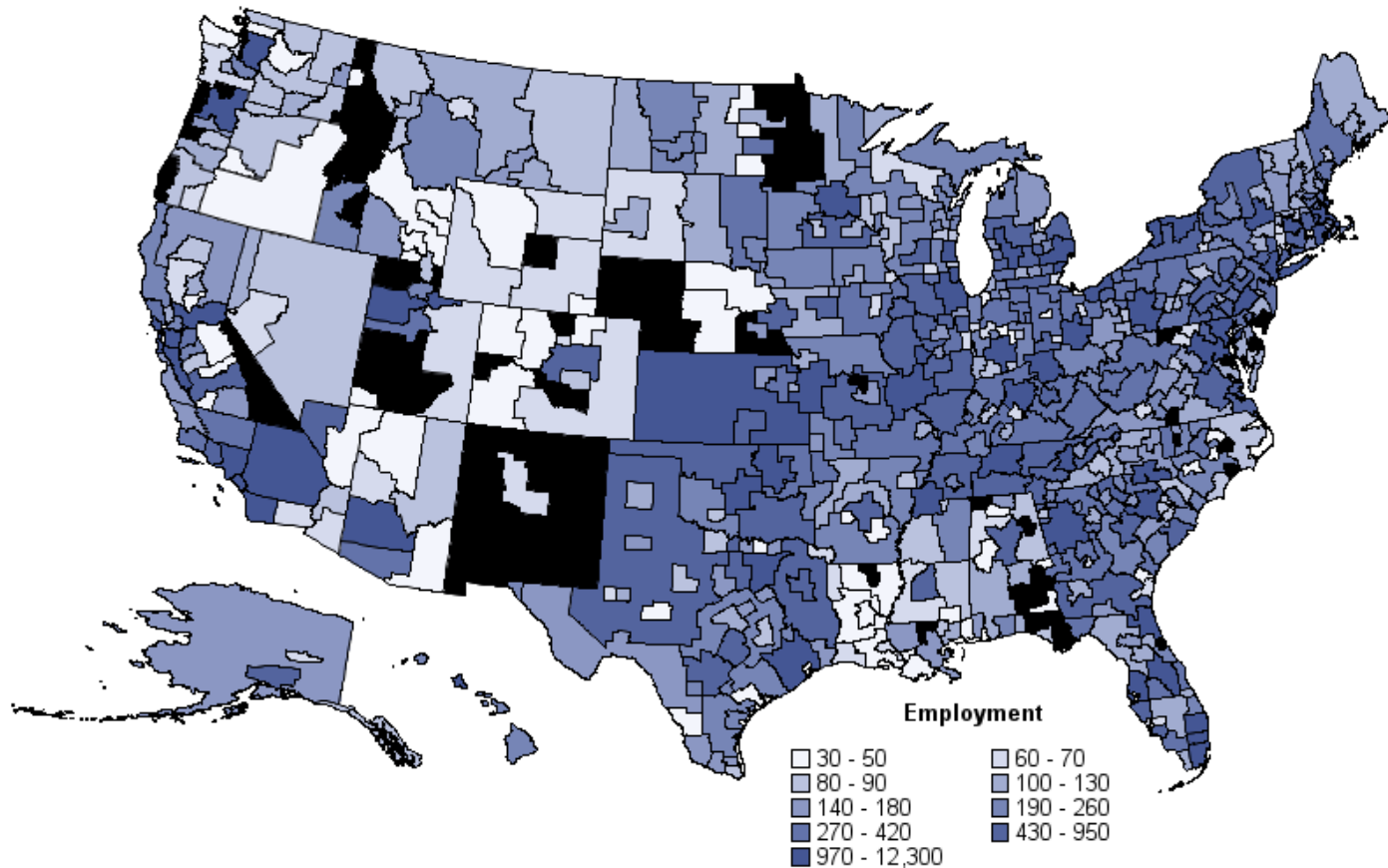Employment of Computer and Mathematical Occupations

# Software Defaults

- Number of levels (categories):
  - ▶ FLOOR(1+3.3 log(n)), where n is # of response variables.
    - – n= 52 (states) → 6 levels
    - – n=575 (MSAs) → 10 levels
  - ▶ Alternative: user specify # of levels
- Ranges of levels determined by:
  - ▶ "Equal distribution (quantizing) algorithm"
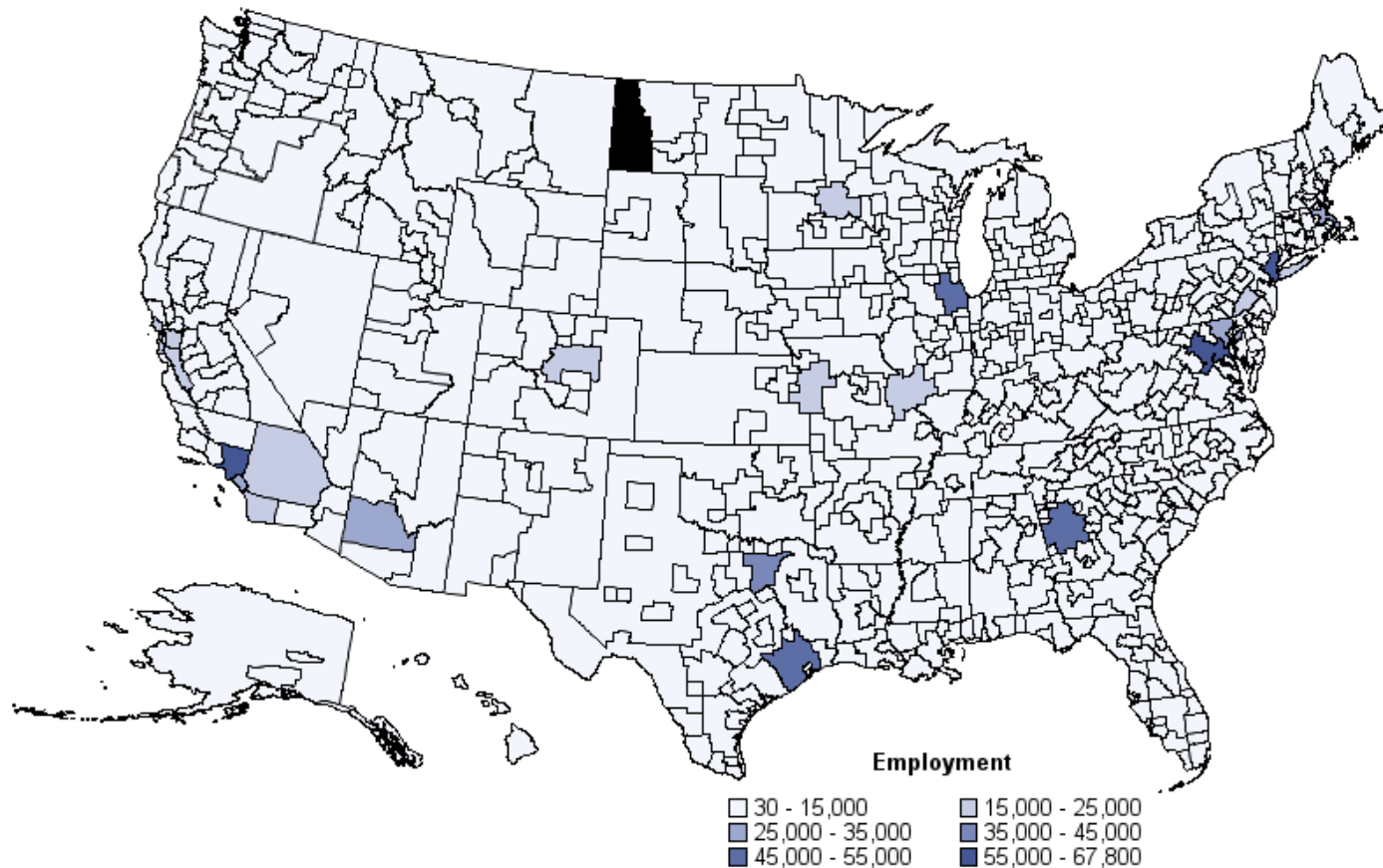  - ▶ Alternative: Nelder Algorithm (Applied Statistics 25:94-7, 1976)

# Default # of Levels



Employment of chief executives, by area, May 2011

Employment
- 30 - 50
- 60 - 70
- 80 - 90
- 100 - 130
- 140 - 180
- 190 - 260
- 270 - 420
- 430 - 950
- 970 - 12,300

Blank areas indicate data not available.

# Nelder Equalizing Algorithm



Employment of general and operations managers, by area, May 2011

# May 2011 – Employment



Employment of statisticians, by state, May 2011

Employment
- 30 - 40
- 110 - 260
- 490 - 740
- 50 - 100
- 290 - 470
- 860 - 3,210

Blank areas indicate data not available.

# May 2012 - Employment



Employment of statisticians, by state, May 2012

**Employment**

- ☐ 30 - 70
- ☐ 80 - 270
- ☐ 300 - 610
- ☐ 660 - 3,140

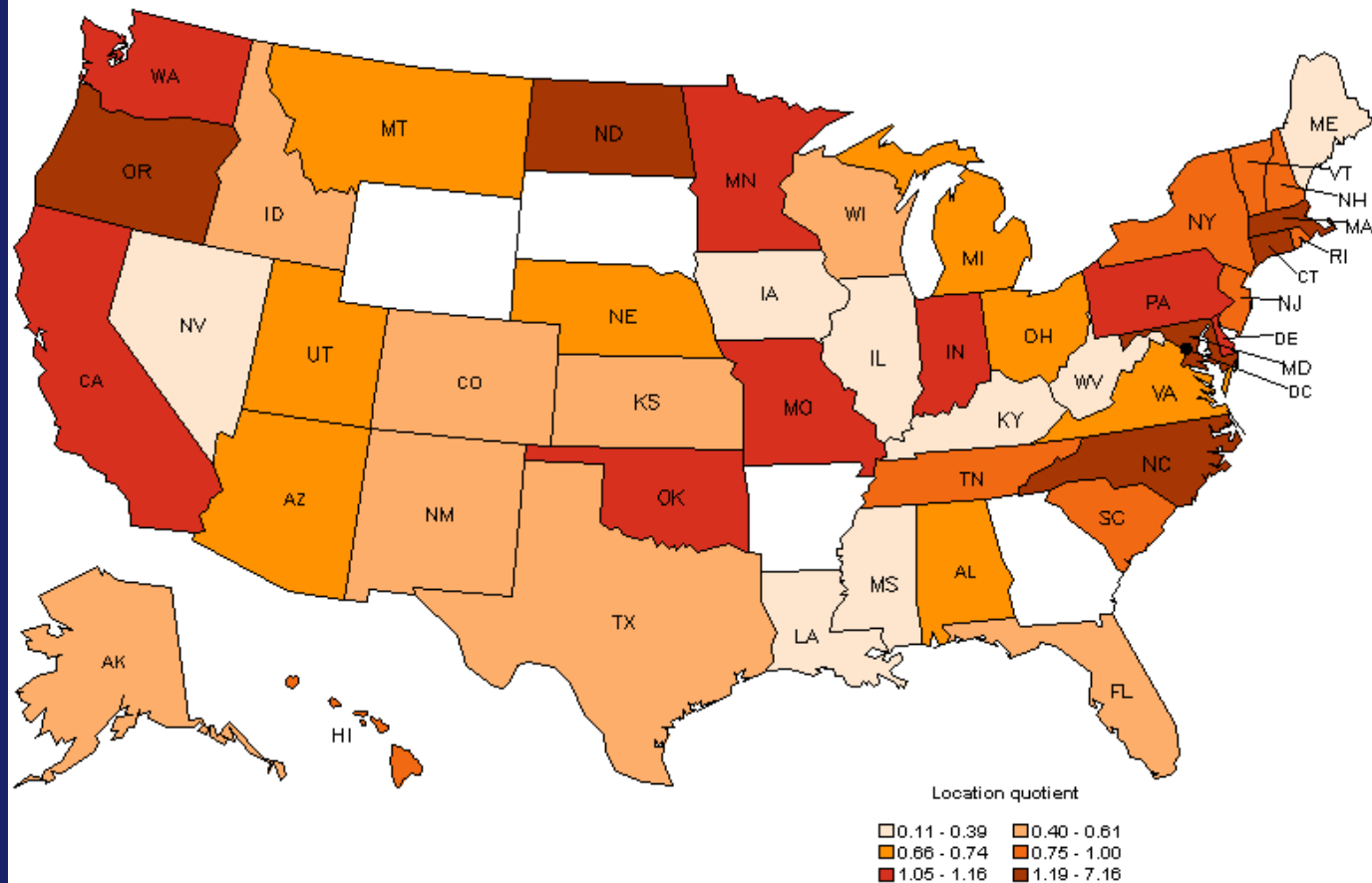Blank areas indicate data not available.
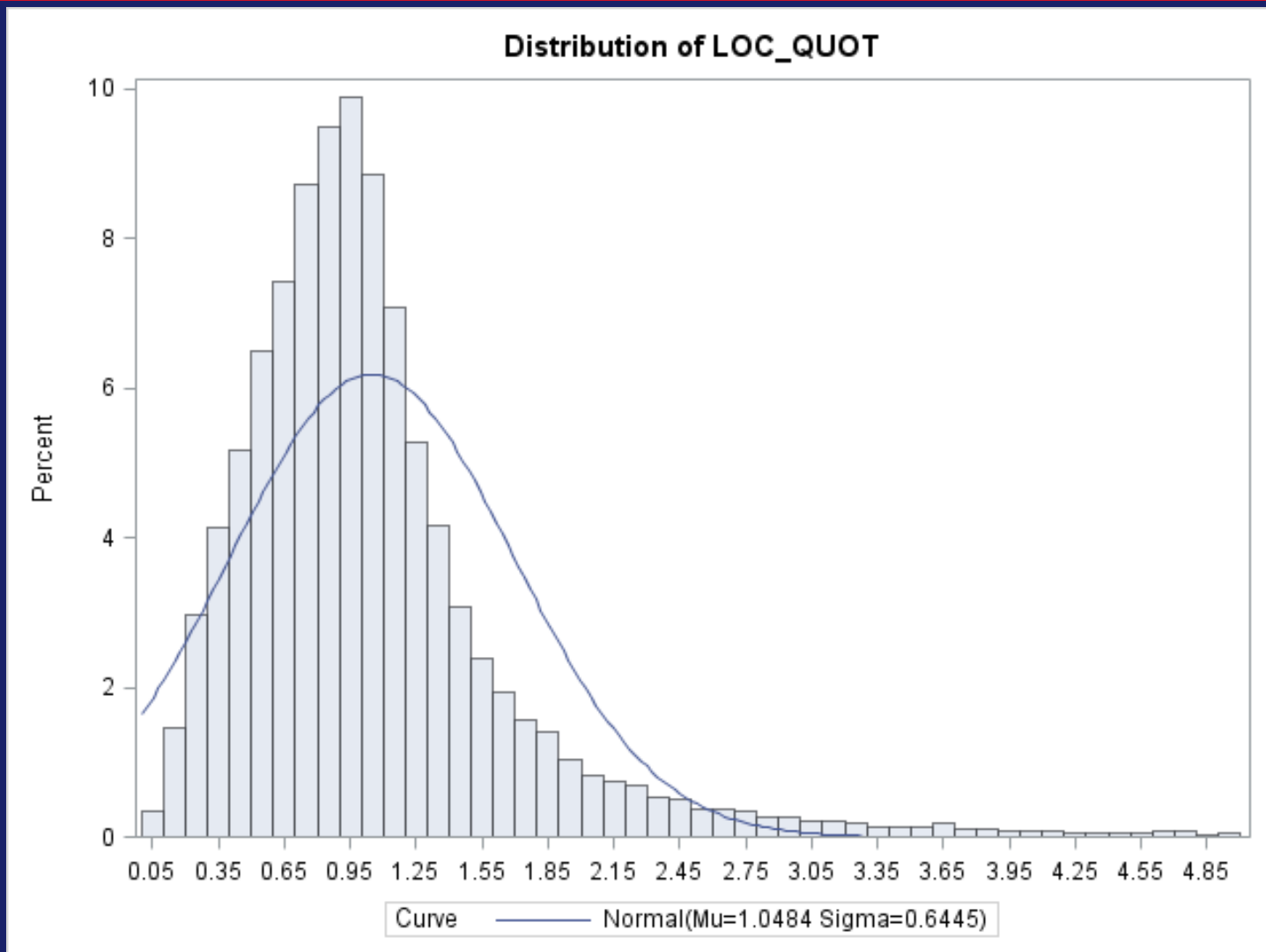
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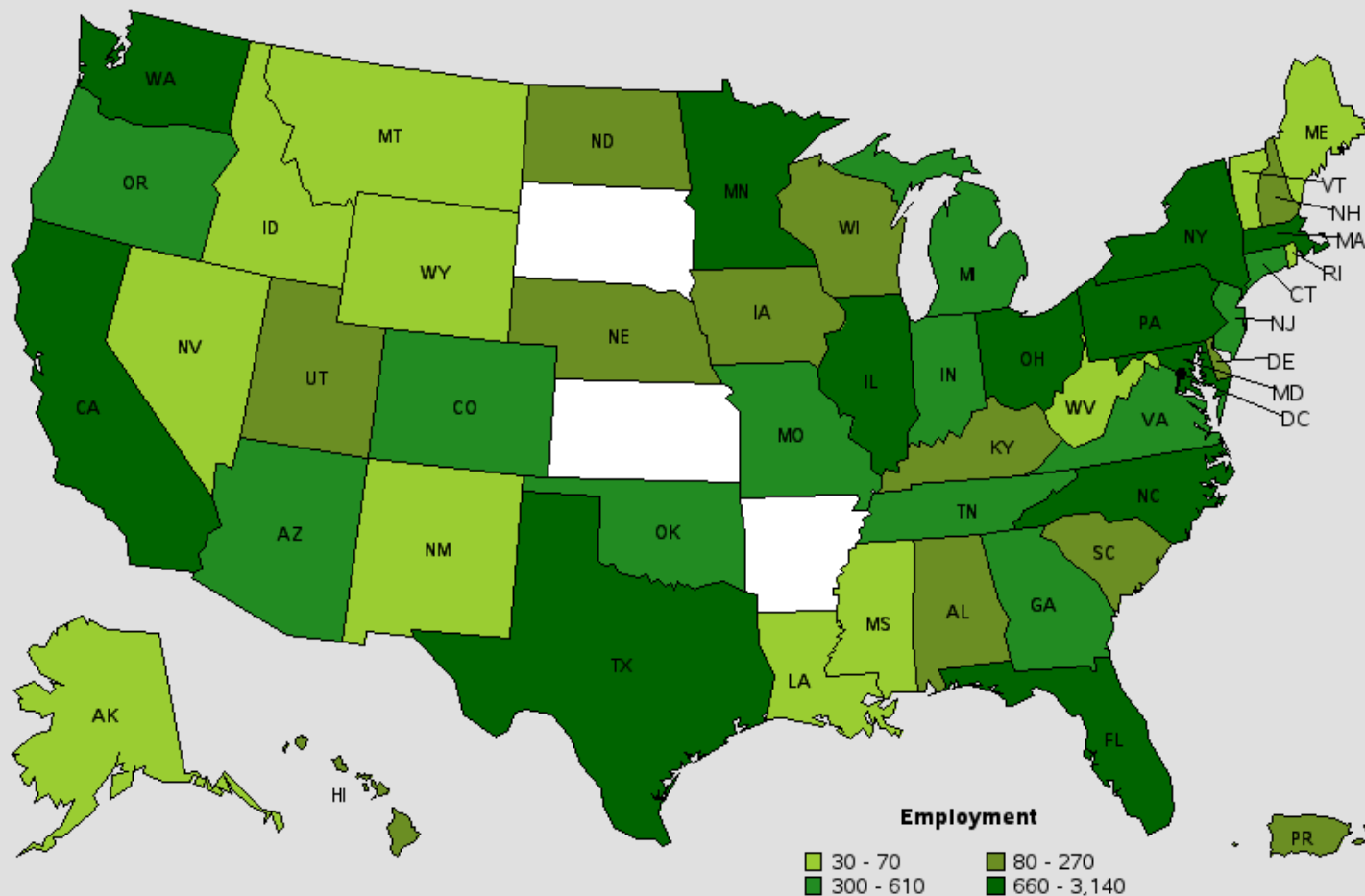
# Location Quotient

- Ratio of:
  - ▶ ( area occupational emp / area total emp )  to
  - ▶ ( US occupational emp / US total emp )
  - ▶ Example
    - – Bakers in Breadtown= 5
    - – Workers in Breadtown = 50
    - – Bakers in Breadland = 2500
    - – Workers in Breadland = 200,000
    - – **LQ =** (5/50) / (2500/200,000) = **8**

- Popularized by BLS (?)
  - ▶ QCEW LQ Calculator

# May 2011 – LQ



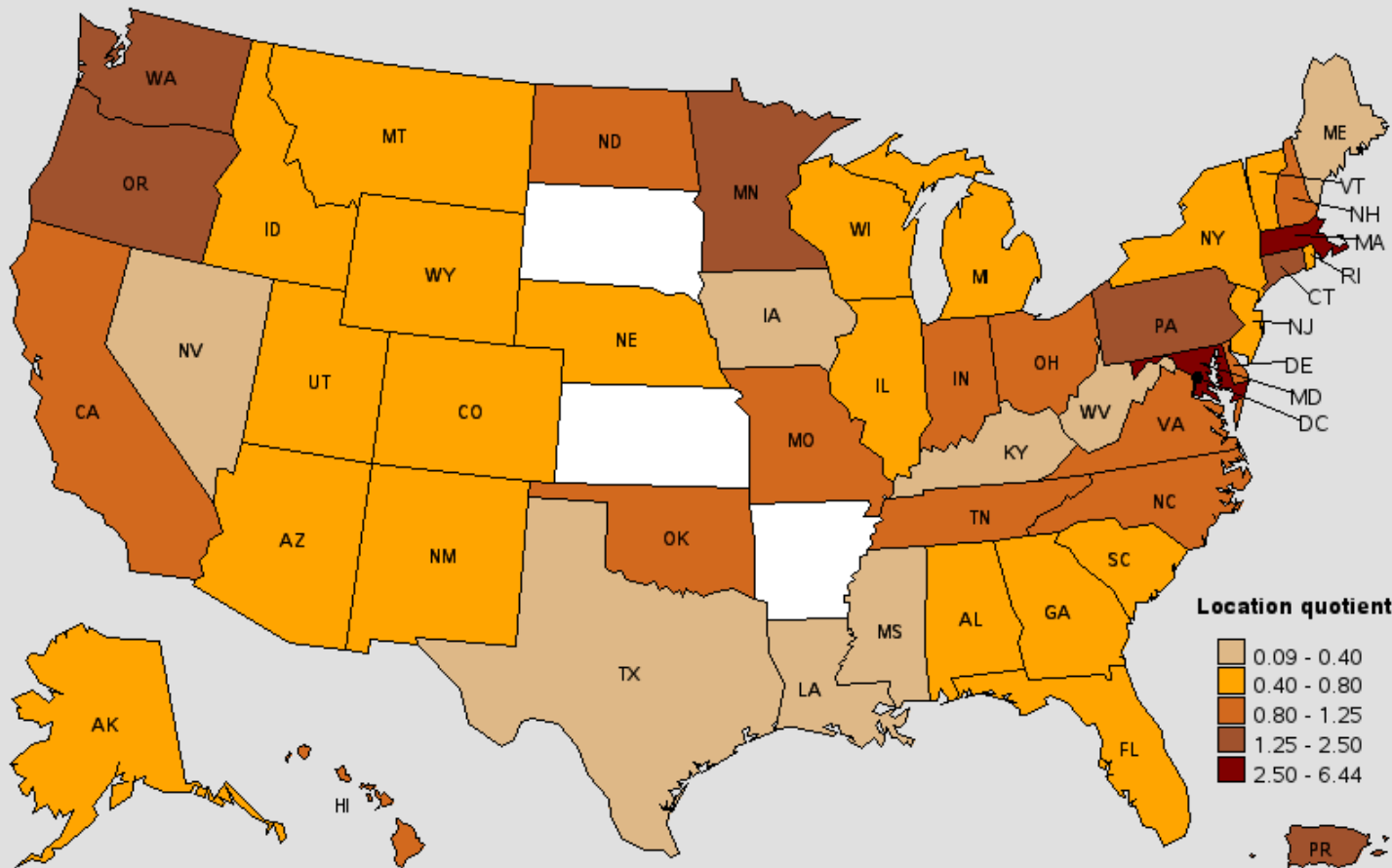Location quotient of statisticians, by state, May 2011

Location quotient

☐ 0.11 - 0.39  ☐ 0.40 - 0.61
☐ 0.66 - 0.74  ☐ 0.75 - 1.00
■ 1.05 - 1.16  ■ 1.19 - 7.16

Blank areas indicate data not available.

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# LQ values, States



Distribution of LOC_QUOT

# May 2012 - LQ



Location quotient of statisticians, by state, May 2012

Location quotient
- 0.09 - 0.40
- 0.40 - 0.80
- 0.80 - 1.25
- 1.25 - 2.50
- 2.50 - 6.44

Blank areas indicate data not available.

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# Future Research

- Possible changes to existing products
  - ▶ New algorithms for levels
  - ▶ Levels by size classes
  - ▶ Use polys instead of exact areas

- Possible creation of new visual products
  - ▶ Unused variables (e.g. wages in bar charts)
  - ▶ New spatial concentration indices (e.g. Gini)
  - ▶ Other data transformations

# Contact Information

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