The Career Atlas: Mathematical Notation

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1. Basic Definitions

1.1. Skill Sets

The i-th professional attribute, or competency, of a person k is defined as:

$$a_i^k \in [0, 100],\tag{1}$$

where the interval $[0, 100]$ determines the bounds for every competency.[1]

The skill set, or career profile, of a person k is defined as the vector of their m attributes:

$$\boldsymbol{a_k} = (a_1^k, \ldots, a_m^k).\tag{2}$$

A skill set matrix, or career profile matrix, is the collection of all n skill sets in the economy:

$$\mathbf{A} = \begin{bmatrix} a_1^1 & \ldots & a_m^1 \\ \vdots & \ddots & \vdots \\ a_1^n & \ldots & a_m^n \end{bmatrix}.\tag{3}$$

1.2. Skill Set Normalization

Normalization by the scale bounds is defined by the tilde operator:

$$\tilde{a}_i^k = \frac{a_i^k - 0}{100 - 0} = \frac{a_i^k}{100} \in [0, 1];\tag{4}$$

$$\boldsymbol{\tilde{a}_k} = (\tilde{a}_1^k, \ldots, \tilde{a}_m^k);\tag{5}$$

$$\mathbf{\tilde{A}} = \begin{bmatrix} \tilde{a}_1^1 & \ldots & \tilde{a}_m^1 \\ \vdots & \ddots & \vdots \\ \tilde{a}_1^n & \ldots & \tilde{a}_m^n \end{bmatrix}.\tag{6}$$

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[1] More generally, these could be defined as a_{lb} (the lower bound) and a_{ub} (the upper bound). Here, the interval $[0, 100]$ is used because of its ease of interpretation.

Normalization by a skill set's highest attribute is defined by the hat operator:

$$\hat{a}_i^k = \frac{a_i^k}{\max\limits_j a_j^k} \in [0, 1];$$

(7)

$$\hat{\boldsymbol{a}_k} = (\hat{a}_1^k, \ldots, \hat{a}_m^k);$$

(8)

$$\hat{\mathbf{A}} = \begin{bmatrix} \hat{a}_1^1 & \cdots & \hat{a}_m^1 \\ \vdots & \ddots & \vdots \\ \hat{a}_1^n & \cdots & \hat{a}_m^n \end{bmatrix}.$$

(9)