The η-Index: A Theory of Assessment in the Formal Sciences

Luqman Malik, NR 2.1
Hilix Research and Technologies
Berkeley, California

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This article is an axiomatizing of the notion *ubiquitous accreditation* in the formal sciences. We endeavor to chart the theoretical pretext for a pan-alternate solution to the Carnegie problem by focusing solely on ipsative scoring of computable documents and criterion-based content dissemination. We commence by discarding the century-old Carnegie Unit[1], credit hour, and grade-point averaging metrics, i.e., norm-referencing. Thereafter, we develop the η-index : $[\eta_s, \eta_r]$ as a discrete interval over which to score and rank corpora, and we indicate how this schematic yields an assessment of indelible knowledge more so than ostensible recall. We conclude with a table diagramming the attributes of η-ranking.

1 Motivation

Given the advent of modern computing, we aim to construct a universal assessment mechanism that is fundamentally quantitative and unambiguous in scoring academic progression in the formal sciences (by which we mean mathematics, logic, linguistics, informatics, and theoretical physics). Absent of digital typesetting and file sharing, such a task appears overly punctilious – if not implausible. Today, it is indeed trivial and need only be expressed clearly so that it may begin to permeate through the wider culture. Without pretense, the uncensored motive in preparing this document is to effectuate that timely objective.

[1]Silva, White, Toch (2015). *The Carnegie Unit: A Century-Old Standard in a Chang...*

2 The η-Index

Remark 1. Let ϕ denote the number of valid lines written in a corpus C_i with terminal width l given in *characters per line* (CPL). Let n denote the number of problems in a corpus C_j to which C_i refers. Let ω represent the weight of C_i measured in bytes, and lastly, assume the interval $\eta = [0, 2]$.

Definition 2.1. The η-score of a corpus C_i, denoted $\eta_s(C_i) = (\phi \cdot n)/\omega^2$, is a measure of proficiency in C_j on the interval η.

Remark 2. Before we give an explicit definition of *proficiency*, we have to articulate a complete description of η's boundary conditions. Immediately, we see that $(\eta_s = 0) \leftrightarrow (\phi = 0 \vee n = 0)$ and that $(\phi = n = \omega) \rightarrow (\eta_s = 1)$. But, there is more to make out. Notice that η_s may approach 1 for several different reasons, and it turns out that each of them is illuminating in their own right. Notwithstanding, we are most interested in the case

1. $(\eta_s \rightarrow 1^+) :: (n = k) \wedge [(\phi/\omega) \rightarrow 1^+], \text{where } k \in \mathbb{N},\ \omega \leq \phi,\ \text{ and } \phi \rightarrow n.$

Moreover, we see that $2 \leq \eta_s(C_i)$ as $\phi \rightarrow -\infty$ with $\phi \leq n$. This case is particularly interesting because it reflects the author's degree of intent and ability in developing C_i. Expressive liberty is always a relevant factor in higher learning, but elegance and efficiency are superior traits in the formal sciences. Conversely, suppose $\eta_s \rightarrow 0^+$. One way this might occur is if $\phi \leq n < \omega$. It is appropriate to gauge the author, as $(\omega - n) \rightarrow \infty$, under prepared or even inept in the case where ω is unduly large and there is no evidence of deliberate editorial labor.

Definition 2.2 (Proficiency)**.** $\eta_s(C_i) \rightarrow 1^+$.

Table 1. η-rank

				[η_1]
Mathematics	Logic	Linguistics	Informatics	Physics
$10[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$10[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$10[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$10[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$10[\mathsf{KP,KL}\vert\mathsf{qKB}]$
$\mathsf{KP} = 10^3$pblm	$\mathsf{KL} = 10^3$lin	$\mathsf{qKB} = 100\mathsf{KB}$	10o-xms	bac thesis
				[η_2]
Mathematics	Logic	Linguistics	Informatics	Physics
$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$
				[η_3]
Mathematics	Logic	Linguistics	Informatics	Physics
$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$	$15[\mathsf{KP,KL}\vert\mathsf{qKB}]$
15o-xms	dct thesis			