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⊕ TEXA - MATHEMATICAL REPRESENTATION :

I.> TEST SERIES :

1.> A test Comprises of an Human Intelligence & Artificial Intelligence showcased by a Human Interrogator & the computer respectively

Let $f(m) = t_1 + t_2 + t_3 + t_4 + \dots + t_{n-1} + t_n$

where $m \rightarrow n^{th}$ transaction vector ϕ $m = n/2$ & $m \geq 1$, $n \geq 2$

Human & A.I correspondence is alternative in nature.

i.e., $f(m) = t_1 + t_2 + t_3 + \dots$

$= A_0 + H_1 + A_2 + H_3 + \dots$

where,

$A_0 + A_2 + A_4 + A_6 + \dots$ is the Even Series representing transactions from an A.I :

$$\boxed{\therefore T_n = 2(n-1)} \Rightarrow \boxed{A_{2(n-1)}}$$

where,

$H_1 + H_3 + H_5 + H_7 + \dots$ is the Odd Series representing transactions from an Human Interrogator :

$$\boxed{\therefore T_n = 2n-1} \Rightarrow \boxed{H_{2n-1}}$$

$(\forall n \in W$ (or Z^+)$, n \geq 1)$, n is the Quantum Variable of the Transaction Seri

in the Test Instance. Hence, $A_{2(n-1)}$ & H_{2n-1} are Quantum Scores.

II •> VALUE DISTRIBUTION OF QUANTUM SCORES :

1.> Based on Game theory : A.I wins : +1 & Human looses : −1 .
A.I looses : −1 & Human wins : +1 .

We have Quantum Scores :

$$\underline{A_{2(n-1)}} \quad \& \quad \underline{H_{2n-1}} \quad (; \forall n \geq 1)$$

each contributing to the transaction series $f(m)$.

2.> Scheme of Value Distribution is as follows :

i.> $\underline{A_{2(n-1)}}$:

$$= \begin{cases} 0 & ; \text{ if AI fails in deceiving human interrogator} \\ 1 & ; \text{ if AI successfully deceives human interrogator} \end{cases}$$

ii.> $\underline{H_{2n-1}}$:

$$= \begin{cases} 1 & ; \text{ if Human interrogator recognizes A.I} \\ 0 & ; \text{ if Human interrogator is deceived by the A.I} \end{cases}$$

3.> Eg : For m = 3, n = 1, 2, 3 . . . 6 , Let Quantum Scores for $A_{2(n-1)}$ be $\underline{1, 1, 0 \ldots}$

for H_{2n-1} be $\underline{0, 0, 1 \ldots}$

∴ We get the transaction series :

$f(3) =$

1	0	1	0	0	1	.	.
A_0	H_1	A_2	H_3	A_4	H_5	A_6	H_7

III ∘> MEAN TEST SCORE - COMPUTATION :

1∘> ARTIFICIAL INTELLIGENCE :

$$\underset{\text{(MEAN TEST SCORE)}}{M\cdot T\cdot S} = \frac{\sum_{n=1}^{N} A_{2(n-1)}}{N} \qquad (;\ \forall N \geq 2 \text{ transactions})$$

2∘> HUMAN INTELLIGENCE :

$$\underset{\text{(MEAN TEST SCORE)}}{M\cdot T\cdot S} = \frac{\sum_{n=1}^{N} H_{2n-1}}{N} \qquad (;\ \forall N \geq 2 \text{ transactions})$$

3∘> M·T·S MATRIX :

$$\begin{array}{c|ccccc} & H\cdot I_1 & H\cdot I_2 & H\cdot I_3 & \cdots & H\cdot I_j \\ A\cdot I_1 \rightarrow & (\bullet, \downarrow) & (\ ,\ ) & (\ ,\ ) & \cdots & (\ ,\ ) \\ A\cdot I_2 & \cdot & \cdot & \cdot & \cdots & (\ ,\ ) \\ A\cdot I_3 & \cdot & & & & \cdot \\ \vdots & \vdots & & & & \vdots \\ A\cdot I_i & (\ ,\ ) & \cdot & \cdot & \cdots & (\ ,\ ) \end{array}$$

IV :> CATEGORIZATION :

1 :> An A.I can exhibit its intelligence in multiple directions at multiple levels.

2 :> Categorization & Category scores are critically important in understanding the behavior of A.I in multiple environments.

3 :> MULTI - CATEGORY CLASSIFICATION LOGIC :

PROBLEM : How to classify an A.I / nominate it for multiple categories, all under one test (1 or more) ?

SOLUTION :- By measuring the performance of A.I in handling the questions (ordered in many ways).

- "Slab" is a set of questions pertaining to a category / domain.
- Slabs consists of questions in an ordered / shuffled manner.
- Slabs can also be shuffled in the test instance.

$$- \underset{\left(\substack{\text{SLAB}\\\text{PERFORMANCE}\\\text{FACTOR}}\right)}{S.P.F} = \frac{(\text{RESPONSE FACTOR})_{\text{SLAB}_i}}{(\text{ERROR FACTOR})_{\text{SLAB}_i}}$$

$$- (\text{RESPONSE FACTOR})_{\text{SLAB}_i} = \frac{\sum_{1}^{1} \text{No. OF } Q'\text{s ANSWERED } (\text{i.e., } A_{2(n-1)}) \left[\forall n \in \text{SLAB}_i\right]}{\text{TOTAL No. OF } Q'\text{s IN THE SLAB (SLAB SIZE)}}$$

$$- (\text{ERROR FACTOR})_{\text{SLAB}_i} = \frac{\sum_{1}^{t} \text{No. OF } Q'\text{s FAILED } (\text{i.e., } A_{2(n-1)}) \left[\forall n \in \text{SLAB}_i\right] \text{ IN ALL TEST INSTANCES}}{\text{MEAN SLAB SIZE}}$$

where, SLAB SIZE = $n(\text{SLAB}_i)$ & MEAN SLAB SIZE = $\dfrac{\sum_{x=1}^{u} n(\text{SLAB})_i}{u}$, where $u \rightarrow$ No. of slab$_i$ occurence in 'v' no. of test instance.

IV - CONT'D :-

4.> LOGIC RESULT :

$$- \text{If } S.P.F_i \cancel{(E_i)} = \left\{ \begin{array}{lll} & E_i & \\ <0 : & \text{Result} = -1 & ; \text{ i.e, AI non-performant} \\ >0 : & \text{Result} = S.P.F\,\% & ; \text{ i.e, AI performant to the category.} \\ & (\neq -1) & \end{array} \right.$$

5.> CATEGORY MATRIX :

$$\begin{array}{c|l} & C_1 \quad C_2 \quad C_3 \quad \cdots \cdots \quad C_y \\ A.I_1 & \forall x \in Z^+, \\ A.I_2 & \quad A.I_x \notin C_y \text{ iff } E_i = -1 \\ & \qquad \text{OR} \\ A.I_3 & \forall x \in Z^+, \\ & \quad A.I_x \in C_y \text{ iff } E_i \neq -1 \\ \vdots & \text{where } i = (\cancel{x} \times y) \text{ Row Column Index.} \\ A.I_x & \cdots \cdots \cdots \cdots \quad E_{xy} \end{array}$$

where,

A.I → Artificial Intelligence under Turing Test &

C → Category / Domain to which A.I is tested / not tested.

V -> RANKING :

1.) GENERIC RANKING :

- Generic Performance (per AI) $= \dfrac{\sum_{1}^{v}(M\cdot T\cdot S)AI/v}{\sum_{1}^{v}(M\cdot T\cdot S)HI/v} = \dfrac{\sum_{1}^{v}(M\cdot T\cdot S)A\cdot I}{\sum_{1}^{v}(M\cdot T\cdot S)H\cdot I}$

For x AIs, rankings are ordered based on the Performance.

2.) CATEGORY RANKING :

- Categorie Performance = S.P.F

For x A.Is, category rankings are ordered based on SPF Values.

VI :> GRADINGS : (APPLICATION OF TEXA THEORY)

1:> Grading A.Is will be quintessential in limiting their behaviors in certain environments that are tangibly insecure - physically or mentally.

2.> The S.P.F parameters aids in understanding the strength of the A.I (Responsiveness) in a particular domain.

3:> Some objects may be common to 2 or more (≥ 2) domains. This must not compromise the security of the environment since multiple A.Is / profiles may be deployed onto an instance/robot.

4:> **'G' :**

- A Factor to specify the developer to customize boundaries, thereby providing flexible logic & automation opportunities.
- Let an A.I$_x$ exhibit its intelligence under 2 Categories C_p & C_q, where C_p & C_q correspond to Slab$_p$ & Slab$_q$ with an array of questions in a user-defined order.
- Now, Slab$_p$ & Slab$_q$ may have common objects such as "knife" or other dangerous objects.
- Corresponding $A_{2(n-1)}$ quantum values of such questions are collected from Slabs p & q
- Collected $A_{2(n-1)}$ values of corresponding objects in the questions are operated under AND gate:
- $A_{2(i-1)}$ from Slab$_p$ & $A_{2(j-1)}$ from Slab$_q$ may have common object "knife"

$$\therefore G = A_{2(i-1)} \left(\overset{\&}{\text{AND}} \right) A_{2(j-1)} \quad \Bigg| \quad \text{If } G = \begin{cases} 0 & ; \text{Safe to use, no logic overlapping} \\ 1 & ; \text{Unsafe since overlapping logic.} \end{cases}$$