

Humans in Loops for Deep Learning Transfer based on Principles of Recursive Neural Networks

Amitesh Kumar Singam, Author¹

¹Department of Electrical Engineering; ORCID: [0000-0002-2532-0989](https://orcid.org/0000-0002-2532-0989)

*Corresponding author: amit.singam@ieee.org

Abstract

With Advancement of HCAI and HCI design, Human Centered Artificial Intelligence is mainly focused on AI design support, moreover our past research aspects are concerned with facilitate social participation which we referred as data screening methodology based on ITU Recommendations. [Shneiderman \(2020\)](#) mentioned about three approaches out of which we considered first one i.e, two dimensional HCAI frame works which shows possibility of balancing high levels of Human Control and Automation. Basically Automated Human Control is on trajectory of Artificiality based on Statistical Measure between complexity of artifacts and de-materialization, moreover automation and human control is based on involvement of people's thought process where state of mind unleashes idea's or errors in cyclic order which is referred as "human in loops"(HITL) based on decision Making process or "translations" scientific definition. To be precise it's a two dimensional space where human intuition works on principles of Machines.

1 Introduction

According to Professor Alan Dix, the roots of Human computer Interaction mainly focuses on computer design, moreover this topic relates well with multidisciplinary field, to be precise, its an interaction between Users and Machines. While initially it is concerned between computers and human interaction towards form of information theory, secondly Human Centered Artificial Intelligence correlates well with information coding theory, for instance in my present research work, we did concentrated on Spatial and Temporal data which is mostly concerned with information theory.

1.1 Brief Introduction on my Research Activities

Inappropriate developmental cases in AI will effect human mental conditions because of User Experience, since In case of multimedia applications according to [Pashike et al. \(2023\)](#), complexity of visual content illustrates spatial distortions based on Temporal impairments leads in mental stress disorder in reality because of missing Motion Vectors and it has been proved by two theories based on hypothesis, in first case due to missing motion vectors, coding information can be quantified by error concealment and in second case if rate distortion setting are not default and motion vector feature cannot be used instead spatial distortion are quantified based on motion intensity by metric called Motion Dynamics.

1.2 Literature works

This literature work follows current issues, moreover the main idea focused on analysis over transiting from conventional human interaction within AI computing intelligence from HCI perspective. [Garibay et al. \(2023\)](#) mentioned about Hypothetical approaches for assessments towards limitations of proposed ones may impact on developing HCAI Systems so author introduced strategic recommendations for HCI professionals and its influence towards development of AI systems with HCAI approach.

[Garibay et al. \(2023\)](#) proposed 6 human centre AI grand challenges as a result of international collaboration across academia, industries and government which represents the consensus view of a group which includes 26 experts from the field of HCAI. Authors stated that development of Human centre Artificial Intelligence should be based on human cognitive capabilities and emotion management and also prevent

negative side effects towards being inclusive and avoiding bias in terms of being transparent and accountable.

1.3 Development of Data Annotation

It's a process of labeling individual elements of unstructured data or need to be organized into labeled information for easy recognizing to machines in order to train or test a machine learning model and moreover, Just like optimization of supervised or unsupervised learning methods are mostly concerned with methodology like Feature extraction, optimization of Data Annotation also play vital role during training rather than testing in case of randomization or randomly permuting data with corresponding labels or targets in case of Human centered AI based on non human Interaction.

1.4 Unsupervised learning method based on Data Annotation Optimization Principle

[Singam et al. \(2023\)](#) worked on feature execution using unsupervised method based methodology which was similar to Data Annotation optimization, i.e, Optimization of feature extraction technique was based on variance of individual feature which correlates well with Human centered AI.

1.5 Ethical and safety implications for Human Centered AI

Generalization means degree of uncertainty or incomplete information, in reality it falls in small subset of samples which usually occurs in unstructured data, so we need machine teaching or human centered AI, i.e, Human Supervision is needed, only in case of Unstructured or non organized data because it may not be provably safe and moreover results of non labeled data is not recognized for research practice in case of Machine learning based AI due to advancement of data annotation. Coming to the point, as mentioned in one of previous section of this paper, speaking about "human in loops"(HITL) topic, in some cases the automation and human control may produce errors in cyclic order due to negligence of labeling the data, which is referred as Data Annotation.

2 Human in Loops? , Its Machine Teaching or Human Centered AI

In collaboration of machine learning and teaching, specifically in case of Unsupervised learning its always inconsistency even in reality, so data annotation optimization is mostly required for instance look into geocentric model that resembles with degree of uncertainty where loops location should be labeled towards proper identification of specific location at nth rotation and In case of Supervised Learning, its always consistency where optimization of Data annotation is not required for heliocentric model

2.1 Human in loops II or its out of loop ??

The Mostly crucial things which makes complexity of Human values easiest towards encoding into loops is Consistency of human features such as language, ethics, principles or morals based on errors, towards optimization of Objective or Subjective Annotation firstly for experts based on decisions and for crowds or public based on consistency.

3 Human in Loops with Deep Learning or Interpretation

3.1 Deep Learning Transferring(DLT) or Deep Transfer Learning(DTL) ???

In Technical Terms, loops are born out of a continuous phenomena, for instance its a thought process were sequential execution of error in cyclic order leads to formation of loops and moreover recursive neural networks is most convenient one where this type neural networks works on principle of applying same weights recursively on a structured input.

Deep Learning transferring is a sub category within deep learning process in the field of Artificial intelligence and Machine Learning concepts which describes attempts to understand functionality of Human Brain unlike Deep Transfer learning which is based process of human brain imitation.

3.1.1 Data Annotation based DLT or Data Interpretation based on DTL

The complexity of Human values towards encoding into loops becomes higher when values of human features or principle within Recursive Neural Networks becomes complicated. In other case, looking into things deeply which can only been seen by humans through Perceptions, it is referred as Interpretation and Deep Transfer Learning(DTL) works with convolutional Neural Networks principles.

3.2 Deep Learning Transfer based on Set of Weights

This method actually detects and discards the observations within observers based on decisions of votes given and similarly, the distribution of scores are normal or not is confirmed by the means of β_2 test, moreover mean $\bar{u}_{jklr}^*$, standard deviation S_{jklr}^* and the coefficient β_{2jklr}^* for each of the time windows of each test configuration are calculated.

$$\beta_{2jklr}^* = \frac{m_4}{(m_2)^2}. \quad (1)$$

where

$$m_x = \frac{1}{N} \cdot \sum_{n=1}^N (u_{njklr}^*)^x.$$

The centered scores u_{njklr}^* are computed as follows

$$u_{njklr}^* = u_{njklr} - u_{nklr} + \bar{u}_{klr}.$$

The mean score for each test configuration is computed as

$$\bar{u}_{klr} = \frac{1}{N \cdot J} \cdot \sum_{n=1}^N \sum_{j=1}^J u_{njklr}.$$

u_{njklr} is score of i^{th} observer for j^{th} time window and k^{th} test condition for l video sequences with repetition r . The mean score for observation of each observer and for each test configuration is computed as

$$\bar{u}_{nklr} = \frac{1}{J} \sum_{j=1}^J u_{njklr}.$$

we need to calculate P_i^* and Q_i^* , for i^{th} observer and where P_i^* and Q_i^* are maximum and minimum scores of test sequences given by i^{th} observation of a individual subject or observer.

if $(2 \leq \beta_{2jklr} \leq 4)$ then:

$$\text{if } u_{njklr}^* \geq \bar{u}_{jklr}^* + 2S_{jklr}^* \text{ then } P_i^* = P_i^* + 1$$

$$\text{if } u_{njklr}^* \leq \bar{u}_{jklr}^* - 2S_{jklr}^* \text{ then } Q_i^* = Q_i^* + 1$$

else

$$\text{if } u_{njklr} \geq \bar{u}_{jklr} + \sqrt{20S_{jklr}^*} \text{ then } P_i^* = P_i^* + 1$$

$$\text{if } u_{njklr} \leq \bar{u}_{jklr} - \sqrt{20S_{jklr}^*} \text{ then } Q_i^* = Q_i^* + 1$$

$$\text{if } \frac{P_i^* + Q_i^*}{J \cdot K \cdot L \cdot R} \geq 0.1 \text{ or } \frac{P_i^* - Q_i^*}{P_i^* + Q_i^*} \geq 0.3 \text{ then reject observation of each observer } i$$

- n is number of observations within individual observers.
- j is number of time windows within combined test sequence and condition.
- k is number of test conditions.
- l is number of test sequences
- r is number of repetitions.

3.3 Inserting Citations

Amitesh Kumar Singam, Humans in Loops for Deep Learning Transfer based on Principles of Recursive Neural Networks, 2023

References

- Garibay, O. O., Winslow, B., Andolina, S., Antona, M., Bodenschatz, A., Coursaris, C., Falco, G., Fiore, S. M., Garibay, I., Grieman, K., Havens, J. C., Jirotko, M., Kacorri, H., Karwowski, W., Kider, J., Konstan, J., Koon, S., Lopez-Gonzalez, M., Maifeld-Carucci, I., McGregor, S., Salvendy, G., Shneiderman, B., Stephanidis, C., Strobel, C., Holter, C. T., and Xu, W. (2023). Six human-centered artificial intelligence grand challenges. *International Journal of Human-Computer Interaction*, 39(3):391–437, DOI: [10.1080/10447318.2022.2153320](https://doi.org/10.1080/10447318.2022.2153320), <https://doi.org/10.1080/10447318.2022.2153320>.
- Pashike, V. R. R., SINGAM, A. K., and Shahid, M. (2023). Human perceptions based on translations of recurrent neural networks principles for low latency applications. *Preprints*, DOI: [10.20944/preprints202308.1931.v2](https://doi.org/10.20944/preprints202308.1931.v2), <https://doi.org/10.20944/preprints202308.1931.v2>.
- Shneiderman, B. (2020). Human-centered artificial intelligence: Reliable, safe & trustworthy.
- Singam, A. K., Lovstrom, B., and Kulesza, W. J. (2023). Comparative studies of unsupervised and supervised learning methods based on multimedia applications. *ArXiv*, abs/2303.02446, <https://api.semanticscholar.org/CorpusID:257365646>.

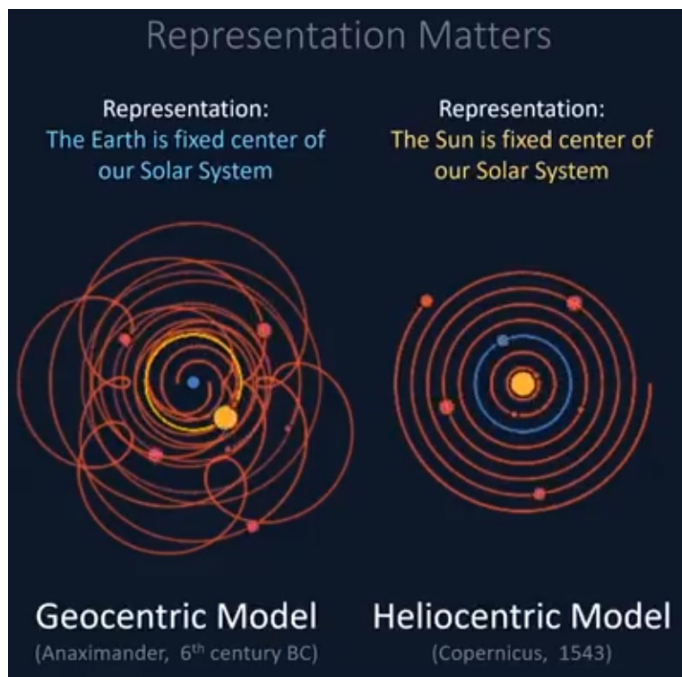


Figure 1: Space/Time Studies over Spatial and Temporal Complexity in loops