Team develops AI to decode brain signals and predict behavior – A Spiritual Insight

By **MATSATI** - August 21, 2021

Scientists have recently developed an Artificial Intelligence (AI) software which has the capability of decoding brain signaling information. Previously, the decoding of these signals required manual inputs, highly processed data, and prior knowledge. In this research [1] it is reported on the development of a deep learning framework which was able to decode sensory and behavioral variables directly from the neural data. The researchers show successful decoding of finger movement, auditory, and spatial behaviors including a novel representation of head direction from the raw neural data.

References

1. *Markus Frey et al,* **Interpreting wide-band neural activity using convolutional neural networks,** *eLife (2021).* DOI: 10.7554/eLife.66551

This research was conducted by a team of researchers consisting of Kavli Institute for Systems Neuroscience, Centre for Neural Computation, The Egil and Pauline Braathen and Fred Kavli Centre for Cortical Microcircuits, NTNU, Norwegian University of Science and Technology, Norway; Max-Planck-Insitute for Human Cognitive and Brain Sciences, Germany; Cell & Developmental Biology, UCL, United Kingdom; Institute of Behavioural Neuroscience, UCL, United Kingdom; Open Climate Fix, United Kingdom; DeepMind, United Kingdom; Institute of Psychology, Leipzig University, Germany. The advances in this technology allow for new discoveries and closer integration between technology and the human brain. This research helps to accelerate discoveries of how brain activity is related to our behavior. This study used what is called a Convolutional Neural Network to decode brain signals. A neural network is a subset of machine learning technology which contains an input layer, and then one or more hidden layers and an output layer. There are many designs of neural networks, such as the feedforward design which required initial user input

training, identifying objects in images as an example. The Convolution neural network is a more scalable approach to image classification and object recognition. The convolutional neural networks (CNN) in their performance are superior to other neural networks in image, speech, and audio signal processing. There are three main layers, (i) the convolutional layer, (ii) the pooling layer, and (iii) the fully connected layer. The CNN is made up of a 3D array of weights which represent the image for example in three dimensions, height, width, and depth.

These days, larger and larger datasets are being recorded from the brain by scientists, however understanding that information can be quite challenging as the messages being transmitted are in many cases not known. This research [1] was conducted in order to create a way to analyze the raw data automatically circumventing the need for manual input to help the algorithm decipher the signals. This research was conducted on rats and was capable of predicting the position, head direction, and running speeds of the animals. The major advancement in this study was that this neural network was not constrained by existing knowledge. The paper reported how CNN was able to identify new aspects of the brain signals by recognizing previously unrecognized signals related to head direction, for example. These results revealed the head position was encoded in interneurons in a region of the hippocampus that is among one of the first to show functional defects in people with Alzhiemers disease. The most fascinating aspect of this research was in the ability to predict behavior from different types of recording across the brain areas, which may be used to infer movements, such as our hands. This approach is believed to be capable of predicting higher-level cognitive processes in humans such as in reasoning and problem solving.

The Spiritual Insights that we receive from this type of research is related to the interpretation of data which has its analogy to the interpretation of the bible. The Hebrew scriptures are called the Tanakh (תנ״ך) which is an acronym for the three divisions in the Tanakh, the Torah (ת, law), the Neviim (נ, prophets), and Ketuvim (כ, writings). The Tanakh (Old Testament) is divided into these three main sections. When compared to the English bibles, most all english bibles place the books of the Tanakh into chronological order. The Hebrew bible, however, organizes the books into these three groups. The Torah is the first five books of Moshe, also known as the Chumash meaning 5 for the five books of the Moshe. The Torah is divided into 54 smaller portions called the Parshiot, and each is named by the first distinctive word at the beginning of the Torah Portion. The Word Torah is best understood to mean *"teaching," "instruction,"* or *"understanding"* as opposed to the word *"law."* The prophetic books (Neviim) are divided into two parts, one is the former prophets, and the other later prophets. The Writings section contains an assortment of books which are labeled the writings, such as the Psalms, the Proverbs, and historical books like the Chronicles, there are twelve books (thirteen if we count 1 and 2 chronicles) in all in the Ketuvim section of the Tanakh.

When one embarks on the study of the Hebrew Scriptures, one is introduced to a variety of issues, one of which is found in the attempt to translate the Hebrew text alone into English. It is interesting while reading the Hebrew Bible, the Hebrew language itself, the way it is constructed, in some instances is not straight forward. This draws out the significance of the issue of mindset. In contrast to our Western mindset, there is something called the Hebraic mindset. The Western Mindset prefers direct, rational, linear, logical, and obvious statements in the use of language. The Israelites however understood that the Holy

Scriptures often contained more than one dimension of revelation. As a result, the study of the bible was categorized into four different levels, (i) the Peshat, (ii) Remez, (iii) Drash, and (iv) Sod. The Peshat level of textual criticism is related to the literal meaning of the text. This basically looks at the events that took place, and the way in which God interacted with Israel and the nations; this draws on the concept of the Mitzvot, the commands. We note that the plain sense of the text is important, however the higher level interpretations, such as the spiritual meanings are not spoken of directly. Remez means *"hint"* or *"allegorical"* level. At this level when reading the text there is a hint of something more going on such as the teaching of a moral principle or of righteousness and truth. A good example of this is found in the idea of what exactly took place during Stephen's stoning, which we read in Acts 6:9 and 7:54-60. If we ask the question, what was the reason for Stephen being stoned? Many would say that it was due to his teaching about Yeshua and the Gospel Message. The actual reason why he was stoned is found in the details according to Acts 6:9-14.

ACTS 6:9-14

6:9 BUT SOME MEN FROM WHAT WAS CALLED THE SYNAGOGUE OF THE FREEDMEN, INCLUDING BOTH CYRENIANS AND ALEXANDRIANS, AND SOME FROM CILICIA AND ASIA, ROSE UP AND ARGUED WITH STEPHEN. 6:10 BUT THEY WERE UNABLE TO COPE WITH THE WISDOM AND THE SPIRIT WITH WHICH HE WAS SPEAKING. 6:11 THEN THEY SECRETLY INDUCED MEN TO SAY, 'WE HAVE HEARD HIM SPEAK BLASPHEMOUS WORDS AGAINST MOSES AND AGAINST GOD.' 6:12 AND THEY STIRRED UP THE PEOPLE, THE ELDERS AND THE SCRIBES, AND THEY CAME UP TO HIM AND DRAGGED HIM AWAY AND BROUGHT HIM BEFORE THE COUNCIL. 6:13 THEY PUT FORWARD FALSE WITNESSES WHO SAID, 'THIS MAN INCESSANTLY SPEAKS AGAINST THIS HOLY PLACE AND THE LAW; 6:14 FOR WE HAVE HEARD HIM SAY THAT THIS NAZARENE, JESUS, WILL DESTROY THIS PLACE AND ALTER THE CUSTOMS WHICH MOSES HANDED DOWN TO US.' (NASB)

Notice what is taking place here, there were a couple of false accusers that stood up and argued and then conspired to give false testimony against him. Their approach to stopping Stephen was by saying, *"We have heard him speak blasphemous words against Moses and against God."* (Acts 6:11) So the charges brought against Stephen follow what is written in Devarim / Deuteronomy 12:32, א אֶת כָּל-הַדָּבָר אֲשֶׁר אָנֹכִי מְצַוֶּה אֶתְכֶם אֹתוֹ תִשְׁמְרוּ לַעֲשׂוֹת לֹא-תֹסֵף *12:32* עָלָיו וְלֹא תִגְרַע מִמֶּנּוּ: *'Whatever I command you, you shall be careful to do; you shall not add to nor take away from it.* (NASB, Devarim / Deuteronomy 13:1 in Hebrew bible) So the idea was not simply a matter of claiming a destruction of the Temple, but of changing the command and the penalty was death by stoning on the testimony of two or three witnesses. What this speaks to us is the significance of what we are reading concerning the adding to or taking away from the Word. This is a warning to us who recognize that God continues to take this commandment very seriously, and so seriously as this leads to spiritual death according to Revelation 22.

REVELATION 22:18-19

22:18 I TESTIFY TO EVERYONE WHO HEARS THE WORDS OF THE PROPHECY OF THIS BOOK: IF ANYONE ADDS TO THEM, GOD WILL ADD TO HIM THE PLAGUES WHICH ARE WRITTEN IN THIS BOOK; 22:19 AND IF ANYONE TAKES AWAY FROM THE WORDS OF THE BOOK OF THIS PROPHECY, GOD WILL TAKE AWAY HIS PART FROM THE TREE OF LIFE AND FROM THE HOLY CITY, WHICH ARE WRITTEN IN THIS BOOK. (NASB)

We note what is written here concerning the final words of the Bible and the changing of God's Word!

The Drash level of study is the hidden, secret, or mysterious meaning of the text. This comes in the form of parables, alluding to something completely different. There is a certain amount of importance to this level of understanding of the scripture. This method of interpretation involves being trained to hear the truths of the kingdom of God. There are many who do not understand the drash level of teaching. This is why we read yeshua saying, *"having eyes to see but not seeing, and ears to hear but not hearing."* (Mark 4:9-13, 2 Corinthians 4:4, Isaiah 42:19-20) King Solomon said, *"It is the glory of God to conceal a thing: but the honour of kings is to search out a matter."* (Mishley / Proverbs 25:2) Yeshua told us however that *"The secret of the kingdom of God has been given to you."* (Mark 4:11) Yeshua emphasized the significance of the drash, and so we as Yeshua's disciples are called to learn to understand and hear what the Spirit of God is saying to us. The mysteries found in the scripture, one such mystery is concerning the Messiah. The Rabbis say that Moshe was the greatest Messiah. (*Mishneh Torah, Kings and Wars 11:1, Or HaChaim on Leviticus 19:2:13, Pirkei DeRabbi Eliezer 3:3on the question of the pre-existence of the **Messiah**, and cf. Assumption of **Moses** i. 14. were created before the world was created…, etc*)) We note that Moshe never refers to himself in the Torah as Mashiakh (Messiah). Moshe did, however, mention prophetically that there would be another who would come that would be a prophet like him. (Devarim / Deuteronomy 18) Yeshua speaks of this saying, *"And beginning at Moses and all the prophets, he expounded unto them in all the scriptures the things concerning himself."* (Luke 24:27) and *"And he said unto them, These are the words which I spake unto you, while I was yet with you, that all things must be fulfilled, which were written in the law of Moses, and in the prophets, and in the psalms, concerning me."* (Luke 24:44) We also read about the conversation between Philip and Nathanael in John 1:45 *Philip findeth Nathanael, and saith unto him, We have found him, of whom Moses in the law, and the prophets, did write, Jesus of Nazareth, the son of Joseph.(NASB)* Another place we read, *"For had ye believed Moses, ye would have believed me: for he wrote of me. But if ye believe not his writings, how shall ye believe my words?"* (John 5:46-47) Yeshua says the Torah was about the Messiah, the question is *"where is it?"* The idea here is that this is revealed at the drash or mysterious level of the revelation of God.

The sod level of interpretation carries with it the meaning of secret or concealed. It is the deepest level of understanding, the esoteric, hidden, mysterious things given only to those who HaShem calls His own. These things are spoken of in the following verses:

DEVARIM / DEUTERONOMY 29:29

29:29 THE SECRET THINGS BELONG UNTO THE LORD OUR GOD: BUT THOSE THINGS WHICH ARE REVEALED BELONG UNTO US AND TO OUR CHILDREN FOR EVER, THAT WE MAY DO ALL THE WORDS OF THIS LAW. (הַנִּסְתָּרֹת לַיהוָה אֱלֹהֵינוּ וְהַנִּגְלֹת לָנוּ וּלְבָנֵינוּ עַד־עוֹלָם לַעֲשׂוֹת אֶת־כָּל־דִּבְרֵי הַתּוֹרָה הַזֹּאת:)

TEHILLIM / PSALMS 25:14

25:14 THE SECRET OF THE LORD IS WITH THEM THAT FEAR HIM; AND HE WILL SHOW THEM HIS COVENANT. (סוֹד יְהוָה לִירֵאָיו וּבְרִיתוֹ לְהוֹדִיעָם:)

ISAIAH 33:6

33:6 AND WISDOM AND KNOWLEDGE SHALL BE THE STABILITY OF THY TIMES, AND STRENGTH OF SALVATION: THE FEAR OF THE LORD IS HIS TREASURE. (וְהָיָה אֱמוּנַת עִתֶּיךָ חֹסֶן יְשׁוּעֹת חָכְמַת וָדָעַת יִרְאַת יְהוָה הִיא אוֹצָרוֹ:)

Note how David knew this using the word סוֹד (sod) referring to the *"foundation, secret"* things of God. These are things God reveals to those who fear and obey His words. Paul wrote about this according to Colossians 2:2-3.

COLOSSIANS 2:2-3

2:2 THAT THEIR HEARTS MAY BE ENCOURAGED, HAVING BEEN KNIT TOGETHER IN LOVE, AND THAT THEY WOULD ATTAIN TO ALL THE WEALTH THAT COMES FROM THE FULL ASSURANCE OF UNDERSTANDING, RESULTING IN A TRUE KNOWLEDGE OF GOD'S MYSTERY, THAT IS, CHRIST HIMSELF, 2:3 IN WHOM ARE HIDDEN ALL THE TREASURES OF WISDOM AND KNOWLEDGE. (NASB)

Note how Paul speaks of the hidden treasures of wisdom which are found only in the Messiah Yeshua. The sod level of interpretation was given to support Paul's understanding of truth in the Messiah. Kabbalists have spent a great amount of time at this level (sod) studying the ancient writings and wisdom and mysteries found in God's word. The Spiritual Insights that we receive from this type of research related to the interpretation of data, which has its analogy in the interpretation of the Bible, causes us to look a little deeper at the scripture and its underlying meaning and purpose. Because of these truths, such as the stars in heaven being for signs and times (Bereshit /Genesis 1:14-18). Because of these things, Daniel understood this sod wisdom and the prophecy of God, and as a result his students came looking for the newborn king the Messiah Yeshua. We note how the signs in the sky gave them a signal to pursue the king sent of God into this world! This is what interpretation is all about concerning the word of God and what He is seeking to reveal to us. This is the power of God in our lives, to have His son revealed to us so that we may have the forgiveness of sins and everlasting life!

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