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Neutral Networks as promising tools in the educational sector

Neutral Networks play a significant role in our life and they are expected to bring the modernization of society to a whole new level. The report deals with the main advantages and disadvantages of the Artificial Neural Networks in education you should keep in mind when deciding whether to use it.

The aim of the report is to get a glimpse of the challenges and opportunities in the application of neural networks in the educational sector. A neural network is a sort of computer software, inspired by biological neurons [1]. It is an example of machine learning, where a program can change as it learns to solve a problem. Neutral Networks have enriched the range of educational resources and made teaching methods more flexible.The traditional teaching model can no longer meet the requirements of information teaching. For example, neural networks can help teachers reduce the time it takes to check student work, analyze data, identify students' weaknesses, create personalized learning materials, create virtual classrooms and learning environments that allow students to learn in an interactive way. At present teachers use electronic equipment to teach students and to learn.

One of the most popular AL tools among students is Chat GPT. It is quickly becoming a valuable tool because it can generate human-like responses to prompts provided by users. Students usually use this tool to write essays and papers, summarize texts or information for a particular subject. Chat GPT can decode text from English into Russian and vice versa. Another popular tool which is used by students is an AI presentation maker. It is one of the efficient ways to interact with other students and share their information. These tools can assist with all aspects of the presentation creation process. AI presentation tools can craft professional-looking slide decks that are relevant to defined content [2]. AI presentation makers help you produce engaging content in just seconds. Your task is to determine which suits your workflow and style best.

While AI has brought significant efficiencies in the learning process but there are some disadvantages. AI-driven lesson plans may lead to a reduced demand for human teachers. It may threaten jobs such as administrative staff, tutors, and counselors. Automation of tasks like scheduling, tutoring, and student guidance may lead to a reduction in the need for human support personnel [3]. It may not adequately evaluate critical thinking and other essential skills. Over reliance on AI in education can lead to a dependence on technology. Students may become less adept at problem-solving in non-digital environments. Learning to navigate AI tools effectively requires time and training, which may divert attention from learning subject matter content. The integration of AI in education opens up new avenues for security risks and cyber threats.

Thus, while AI in education holds immense potential for innovation and efficiency, striking a balance between technological advancement and preserving the human aspects of education is essential to create an equitable learning environment. Educators, policymakers, and stakeholders must address these challenges proactively to harness the benefits of AI while mitigating its potential drawbacks in the field of education.

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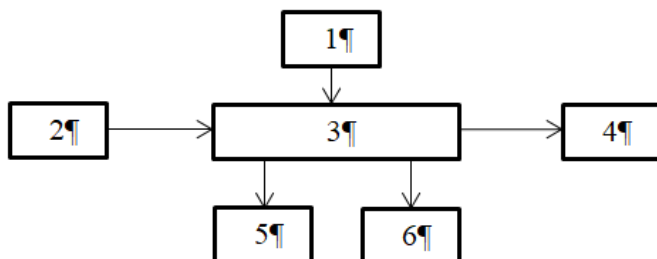Руководитель: ст. преподаватель К.О. Мацкевич
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Experimental setup for creating and researching mockups of signal amplifiers

The developed installation allows you to create layouts of various variants of signal amplifiers in the audio frequency range. As well as to check the operability of these devices, measure parameters and study their characteristics.

The diagram of the electrical structural unit is shown on drowing 1.

Drowing 1

The diagram shows: 1- laboratory bipolar power supply (12 volts); 2- standard signal generator; 3- experimental stand; 4- digital storage oscilloscope; 5 digital multimeter; 6- nonlinear distortion meter.

Power supply unit 1, provides the stand with energy. The audio signal generator 2 generates a test signal of a given frequency and amplitude. Laboratory stand 3 is designed to form and create a layout of a specific variant of a signal amplifier. Using an oscilloscope 4, the shape and amplitude of the signals of the experimental stand are observed. The digital multimeter 5 allows checking and setting the modes of the radio engineering elements of the signal amplifier, using direct current and measuring the resistance of the circuit at control points. The nonlinear distortion meter 6 provides measurement of the harmonic coefficient of the experimental stand signals.

The experimental setup allows you to develop real practical skills in creating amp layouts and conduct research on the following circuit options: single-stage and two-stage harmonic audio signal preamps with inverting and non-inverting input signal; output stages of amplifiers operating in "B" and "A-B" modes; two-stage and three-stage power amplifiers, with general and local negative feedbacks.

To ensure the above, the experimental setup includes three basic stages: two preliminary stages and one output stage. The preliminary stages are built on operational amplifiers. The output stage is built on complementary medium-power transistors. The formation of a specific amplifier circuit is carried out by soldering (soldering) with a soldering iron of the corresponding radio elements and (or) connecting wires into the base stages.

The data of an experimental study of a three-stage audio signal amplifier and the individual links from which it is built are presented. The studies were conducted in the frequency range from 20 Hz to 20 kHz. The obtained data confirm the effectiveness of the developed experimental setup.

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**Historians of Russia and England. Sergey Mikhailovich Solovyov and John Dalberg-Acton,
1st Baron Acton**

Each country has its own long history, and this story is unique in its own way. And there are people who study the history of their country. This work is dedicated to two people who studied the history of their country: the Russian historian Sergei Solovyov and the English historian Edward Gibbon

Sergey Mikhaylovich Solovyov born May 17 1820, Moscow, Russia—died April 16, 1879, Moscow, one of the greatest Russian historians. In the course of his academic career Solovyov held several important administrative posts at Moscow University, published several works concerning Peter I the Great and Alexander I, and acted as tutor to the tsarevich Nikolay Aleksandrovich (1859) and to the future tsar Alexander III (1866).[1]

The main theme of Sergei Mikhailovich Solovyov's work is the history of Russia. There are also several works dedicated to the rulers of Russia. "Russian History Textbook" was also written by Solovyov in relation to the gymnasium course, and "Public readings on Russian History" applied to the level of the national audience.[5]

The most famous work is "History of Russia From Ancient Times", but the following works were also written by S.M. Solovyov: "The History of the Fall of Poland", "Emperor Alexander the First. Politics, Diplomacy", and "Public readings about Peter the Great"[5]

For 30 years Solovyov was a lecturer at the Department of Russian History at Moscow University. His carefully thought-out thoughts provoked listeners to think. S.M. Solovyov was a famous historian and researcher. His methodology and approaches to historical research were based on a thorough analysis of sources, a critical approach to interpreting facts and a desire for objectivity. His research and methodology became the basis for many historians and researchers, and his works are still important sources for studying the history of Russia.[5]

John Emerich Edward Dalberg-Acton born in Naples on 10 January 1834, died at Tegernsee, Bavaria, on 19 June 1902. In 1864 Acton began work on a 'History of the papacy during the last three centuries'.Acton was forced to abandon his papal history in the late 1870s, largely because of the problems he faced in acquiring the evidence he required in Italy. He turned to a new project, 'The history of freedom', which he worked on while living on the continent. He is best remembered for the remark he wrote in a letter to an Anglican bishop in 1887: "Power tends to corrupt, and absolute power corrupts absolutely".[2][3]

The main theme of John Dalberg-Acton's works is various aspects of religion and politics.[3]

The most famous work is "The history of freedom and other essays" as a collection of works by John Dalberg-Acton published after his death in 1907.[3]

John Dalberg-Acton was appointed Regius Professor of Modern History at Cambridge University. He gave lectures on the French Revolution and modern history, and was chiefly responsible for organizing the Cambridge modern history.[2] For Acton, in his judgment of politics as of history, morality was fundamental. He was the great modern philosopher of resistance to the evil state. He is remembered as much for his few historical writings as for his prescient concern with the problems of political morality.[4]

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Phraseological Units in Detective Stories by Agatha Christie

The literary prowess of Agatha Christie is undeniable, as evidenced by her status as one of the most celebrated crime fiction authors of all time. Her extensive oeuvre showcases remarkable language mastery, including the deft use of phraseological units. The usage of phraseological units not just enriches the language but also adds depth and complexity to narratives. In the context of Agatha Christie's renowned works, the incorporation of various types of phraseological units plays a pivotal role in enhancing the intrigue and sophistication of her captivating mysteries.

What is a phraseological unit? A phraseological unit (phraseologism) is a lexically indivisible, stable in its composition and structure, integral in meaning, a phrase reproduced in the form of a ready-made speech unit.[4]

The first type of phraseological units used by Agatha Christie is proverbs. Proverbial phraseological units consist of well-established phrases that possess a figurative meaning. These units are often derived from traditional wisdom or folk tales. Agatha Christie skillfully incorporates these units into her narratives to provide insight into human nature and behavior. For example:

1. "Every cloud has a silver lining" - When a seemingly negative situation unexpectedly yields a positive outcome.[1]

2. "You can't have your cake and eat it too" - One cannot possess or enjoy something without sacrificing.[2]

3. "The early bird catches the worm" - Being proactive and punctual leads to success.[3]

4. "Actions speak louder than words" - The impact of one's actions is more significant than mere promises.[3]

5. "Out of the frying pan into the fire" - Escaping from one problem but encountering a worse situation.[5]

What is more, there are various idioms in the works of Agatha Christie. Idiomatic phraseological units are expressions or phrases that have a figurative meaning not derived from the individual words' literal interpretation. Agatha Christie skillfully incorporates idioms into her writing to add color and depth to her characters and plots. For example:

1. "A leopard can't change its spots" - A person's character, especially negative traits, is unlikely to change. [6]

2. "To have a skeleton in the cupboard" - To have a secret that could ruin one's reputation. [7]

3. "To be in hot water" – To be in trouble or facing difficulties. [8]

4. "To bury the hatchet" - To reconcile or make peace with someone. [9]

The next means of expression are various clichés. Clichés are overused expressions or ideas that have lost their originality. Agatha Christie strategically employs clichés in her writing to create familiarity and evoke specific emotions in her readers. For example:

1. Barking up the wrong tree. - Misunderstanding or pursuing the wrong thing. [10]

2. The devil is in the details. - Emphasizing the importance of paying attention to specifics. [11]

Allusions are indirect references to people, events, or literature that add layers of meaning to a text. Agatha Christie masterfully incorporates allusions into her works to enhance the depth and complexity of her narratives. For example:

1. "Et tu, Brute?" [2]

2. "To be or not to be, that is the question." [12]

3. "Elementary, my dear." [5]

Colloquial expressions are informal phrases or sayings that reflect regional or social dialects. Agatha Christie incorporates colloquial expressions into her dialogue to create authentic and relatable characters. For example:

1. "A piece of cake." [13]
2. "Barking up the wrong tree." [14]
3. "Don't let the grass grow under your feet." [15]
4. "In a pickle." [16]
5. "Spill the beans. [17]

To sum it up, the phraseological units employed by Agatha Christie in her works contribute significantly to their literary richness, enhancing the depth and atmosphere of her books. Agatha Christie's ability to seamlessly incorporate these units showcases her remarkable gasp of language, contributing to her enduring legacy as the queen of crime fiction.

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Comparison of pension systems in Russia and Germany

Let's start with the principles on which the social security systems of Russia and Germany are based. In one system or another, the basic principles are universality, solidarity, commitment, and state participation.

As for the types of social security, there are similarities here too. Both states provide pensions, medical care, unemployment benefits, social security for families and children, and social security for the disabled. Special attention should be paid to pension provision.

The German pension system, founded in the 19th century by the Bismarck Generational Pact, is recognized as one of the most effective in the world. The pension "piggy bank" is filled with contributions from the entire working population. It is important to note that deductions are made not from the entire salary, but from the amount up to a legally defined limit. Moreover, insurance premiums are paid on a 50/50 basis, half is paid by the employee, and the rest is paid by the hiring company. This provision is not applicable in the current conditions for the Russian Federation, due to the economic situation of the country. Progressive is and the provision of German law, according to which a German citizen, upon receiving a salary below 450 euros (the minimum "basis"), pays 3.7% of the established income. In August 2018, it was decided in Germany that by 2025 pension contributions would not exceed 20% of the wages of employees. This is due to the distribution of the financial burden. In this case, the employer pays most of it. In the Russian Federation, on the contrary, a fixed tariff rate of 22% is established if insurance premiums for compulsory pension insurance (OPS) does not exceed the limit. The fixed tariff rate set in the Russian This is a regressive measure compared to Germany, where the social status of each citizen is taken into account.

The retirement age in Russia today is a very painful issue, which is why we would like to consider at what age people retire in Germany. Let's figure it out. It turns out that in Germany, as well as in Russia, there is a program to raise the retirement age. That is why retirement depends on the year of birth. Therefore, the exit age now varies from 65 to 67 years old, regardless of gender. Let me remind you that in Russia they are now coming to the following: 60 years of retirement for women and 65 years for men. This means that in comparison with Germany, everything is not as bad as it might seem.

A similar feature of the pension systems of the Russian Federation and Germany is the legally provided right to an earlier retirement. It is worth noting that in the Russian Federation, the list of those who have such a right is much wider today. Early retirement is most often associated with the professional activity of a citizen, which was carried out in special conditions, or conditions of a social nature. The new pension reform of the Russian Federation provides for a maximum length of service for early retirement, which already exists in Germany. By having 45 years of work experience (with payment of taxes to the insurance fund), a citizen gets the right to retire 2 years earlier (at 63-65 years old). There is also a retirement score in Germany. However, the technology of its calculation is much more complicated than in the Russian Federation. If in the Russian Federation, the coefficients for individual periods included in the length of service are taken into account when calculating, then in Germany, when calculating such a score, the age of a citizen, the period of service in the army, the cumulative period of study at universities, as well as the number of children are taken into account. All of the above elements the pension score has a positive effect on the size of the pension. So, even a non-working citizen in Germany has the right to receive a pension.

We would also like to consider separately the question of what pensioners receive in addition to pension contributions in Germany. Because in our opinion, there are many differences from Russia in this area. Assistance to a pensioner in case of loss of a spouse. This assistance is generally an amazing

example of the state's concern for people. It is clear that when a spouse passes away, the financial burden on a pensioner increase. In Russia, no additional payments or care are provided for this, and in Germany, a pensioner in such a situation will receive a double pension. Free medical care for German pensioners. Any operations, any necessary medical care. And the quality of medicine there is excellent, so you should not doubt the provision of these services. The only thing that is partially included in the medical insurance for pensioners is dental services.

In general, we can say that the social security systems of Russia and Germany are similar, but there are differences in some types of pension services.

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The Concept of a House as a Reflection of the National Traditions in the UK

We know that each culture has its own language and history. The world of things expresses the national spirit of the country, and the folk traditions are connected with the human civilization. Acquaintance with any civilization begins with the study of material culture. Of course, full information of folk traditions we can get studying the human dwelling. House as a personal space of a person plays an important role in the English culture. Here we can say that the English house is an example of the reflection of national traditions of British culture.

In the English language, we observe two lexical units "house" and "home" and each of them has special meaning because they are used in different contexts. So, let's start with the lexical unit "home". It is usually used to denote a type of building for family dwelling. Another word – "house" –refers to a building. It means the place that a person lives as a member of society. Also, we use "home" when we feel emotional attachment to a place. For example, it can be a place where a person grew up. That's why "home" is more sensual while "house" is less significant and usually means architectural characteristics. This word is often used by many people, including foreigners and locals.

There are also lots of examples in British literature, where we can see both words: "house" and "home". For example, in the novel "Pride and Prejudice" written by Jane Austen [6] in the early 19th century, the word "house" was frequently repeated as it could help author to underline the description of a classical English manor (house-building, manor), but not to emphasise positive emotions such as love, care, warmth, and comfort. In the novel "Jane Eyre" by Charlotte Bronte [7] the author used the word "house" as well. In the course of action, the main heroine strives to find "native family and hearth". The external view of house and social status are not so important for her. So, in the novel "Wuthering Heights" by Emily Bronte [8], "home" is frequently used as well. The word "home" was to emphasise such feeling as love as for the main character it meant the place where her beloved person lived, despite the harsh living conditions and social prejudices.

Also, it is necessary to say about the proverbs that consider the house as a personal space. For example, curiosity is ill manners in another's house. Besides, British people are accustomed to show respect and tolerance for person's privacy. For example, those who live in glass houses should not throw stones. House is a holy place for British people. Defending their country and their home, British people developed their own character and tough temper: Grace your house, and do not let that grace you.

The beginning of the English house construction is associated with the geographical and natural features of the country. As we know, the UK is characterized by foggy and rainy weather. That's why, the main building materials are stones and bricks. These materials are more resistant to weather conditions and also they protect well from fire in case of fire. Lots of British people use wood only for the decoration of the house. But wooden materials are quite expensive, because there are not many forests in the UK. Of course, there are several features of English building: the desire for isolation, asceticism and economy, strictness in the choice of colors, reliability.

Also, each house in the UK has a certain name in addition to the number system. Of course, house names can be considered as one of the forms of manifestation of the UK individuality. There are several groups of house names: descriptive names, transfer names, name-conversions and borrowed names. Among the names of the UK houses, the descriptive names dominate. This can be explained by the fact that home ownership in the UK is private. It means that houses of this type are the subject of buying and selling and contain more information than others. Usually, the homeowners try to nominate houses using nature, wildlife, geographical and climatic features.

To sum it up, the English house is a reflection of the national traditions and culture of Great Britain. The determined features of the English house are its traditionalism and passion to the past.

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Music in Studying English

It goes without saying that listening to music is a very popular hobby, especially among teenagers. It would be great to learn English through listening to music. Without any doubt, almost every person would like to find a way of learning the language with pleasure. Modern songs provide learners with pretty fluent for improving their spoken skills amount of new wording, phrases and up-to-date slang that will be rather helpful in keeping in touch with the rapidly developing communicative tendencies in the English language. But this way of getting new knowledge is not suitable for everyone.

To prove this statement grammar in the headlines of the most listened songs of different seasons and genres was checked. For the research one of the most popular Russian sites for listening and downloading music according to the results of multiple tops in the Internet [2] was used – Hitmo [1]. 5 out of 100 are entitled with using wrong grammar rules. Here are some examples containing a mistake in their headline:

- Dance the night
- I Knew You Were Trouble

Mistakes in both headlines are skipping the word. As for the first case the translation is «Танцевать всю ночь» [4], so the correct headline would be <Dance all the night>. And the second one can be translated as «Я знала, что ты моя беда» [4], so the correct headline would be < I Knew You Were My Trouble>.

- My Love Mine All Mine

The mistake is missing of the verb <to be>. So, the correct headline would be <My Love Is Mine All Mine>

- Dance Monkey

The mistake is false wording. The translation is «Танцующая обезьянка» [4], so the correct headline would be < Dancing Monkey>.

- The Devil In I

The mistake is the usage of false preposition and pronoun. The right version is < The Devil Inside Me>

So, the results are interesting. There are might be many reasons for making mistakes in the songs. One of them is that the singer just has to keep the rhythm and melody first of all, so many of them ignore grammar, especially in the lyrics.

In conclusion, such kind of learning English is helpful. In order to solve the problem with grammar mistakes, this method should be applied only for those, who has a decent level of English and wants to broaden his vocabulary. So it can be used in universities and for self-education. A variety of songs can be used even for studying English at school for some educational methods, including searching for mistakes and correcting them.

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Frequency Synthesizers: principles, types, and applications

Frequency synthesizer is a special device which people use for generating periodic signals with a necessary frequency, phase, and amplitude with the help of converting a lower frequency reference signal. Frequency synthesizers serve like the sources of the stable (in frequency) oscillations in radio receivers, radio transmitters, frequency meters, signal generators, also other devices where tuning to different frequencies and high stability of the selected frequency is required [1].

They are applied in various fields, such as:

- in radio transmitters and receivers for generating carrier frequency and intermediate frequency signals;

- in radar systems for generating probing signals and heterodyne signals;

- in satellite systems for generating carrier frequency signals and intermediate frequency signals;

- in medical systems, such as ultrasound systems and magnetic resonance imaging (MRI) systems;

- in industrial control systems for generating control signals and feedback signals.

In radio transmitting devices, people use frequency synthesizers to generate the following signals:

- Transmitter carrier frequency. It means that the carrier frequency must be very stable to ensure reliable transmission of information.

- Transmitter control signals. Frequency synthesizers are utilized to generate signals for switching the transmitter operating modes, signals for adjusting the transmitter power, etc.

- Signals for auxiliary transmitter devices. Frequency synthesizers generate signals for power amplifiers, antenna tuners, and other auxiliary transmitter devices [2].

There are several varieties of frequency synthesizers, which differ in the principle of operation, technical characteristics, and field of application:

- Direct digital synthesis (DDS) synthesizers;

- Phase-locked loop (PLL) synthesizers.

In addition, frequency synthesizers can be classified according to the following criteria:

By output signal type people single out analog frequency synthesizers which generate signals using analog circuits, such as oscillators, phase detectors, and filters and digital frequency synthesizers for producing signals using digital circuits, such as microprocessors, digital phase detectors, and digital filters.

By frequency range we can define low, high and ultra-high frequency.

The most wide-spread classification is by the type of reference oscillator used. According to this criterion, frequency synthesizers are divided into quartz, rubidium and atomic oscillators [3].

There are three possible synthesis methods used in frequency synthesizers: direct, indirect and combined.

The direct method of synthesis synthesizer produces the output frequency from the reference frequency.

The indirect synthesis method of the frequency synthesizer applies a phase-locked loop (PLL) to produce the output frequency, which is a multiple or fractional part of the reference frequency. This method allows a wide range of frequencies to be generated with high accuracy and stability.

The combined synthesis method of the frequency synthesizer combines the direct and indirect methods to achieve a wide frequency range and high accuracy [4].

Frequency synthesizers are important components of many modern radio transmitting devices and beyond. They are used to propagate signals with a precisely specified frequency, which is necessary to ensure reliable and efficient operation of radio systems.

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