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# Coronavirus Genome Sequence Similarity and Protein Sequence Classification

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**Abstract.** The world currently is going through a serious pandemic due to the coronavirus disease (COVID-19). In this study, we investigate the gene structure similarity of coronavirus genomes isolated from COVID-19 patients, Severe Acute Respiratory Syndrome (SARS) patients and bats genes. We also explore the extent of similarity between their genome structures to find if the new coronavirus is similar to either of the other genome structures. Our experimental results show that there is 82.42% similarity between the CoV-2 genome structure and the bat genome structure. Moreover, we have used a bidirectional Gated Recurrent Unit (GRU) model as the deep learning technique and an improved variant of Recurrent Neural networks (i.e., Bidirectional Long Short Term Memory model) to classify the protein families of these genomes to isolate the prominent protein family accession. The accuracy of Gated Recurrent Unit (GRU) is 98% for labeled protein sequences against the protein families. By comparing the performance of the Gated Recurrent Unit (GRU) model with the Bidirectional Long Short Term Memory (Bi-LSTM) model results, we found that the GRU model is 1.6% more accurate than the Bi-LSTM model for our multiclass protein classification problem. Our experimental results would be further support medical research purposes in targeting the protein family similarity to better understand the coronavirus genomic structure.

**Keywords:** Coronavirus Disease of 2019 (COVID-19), Severe Acute Respiratory Syndrome (SARS), Genome Structure, Basic Local Alignment Search Tool (BLAST), Gated Recurrent Unit (GRU), Protein Family Accession.

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# Comparing Pregnancy and Childbirth-related Hospital Visits in Arizona Before and During COVID-19 Using Network Analysis

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**Abstract.** The COVID-19 pandemic has had a severe effect on all facets of human society, including healthcare. One of the primary concerns in healthcare is understanding and mitigating the impact of the pandemic on pregnancy and childbirth. While several studies have looked at challenges such as contact tracing of positive cases, predicting confirmed cases and deaths in individuals and communities, few studies have examined differences in hospitalization and treatment of pregnant mothers and infant care in large populations. In this study, the prevalence and co-occurrence of pregnancy and childbirth-related diagnoses reported in Arizona State hospitals for three six-month periods - before COVID-19 (second half of 2019), COVID-19 onset (first half of 2020), and COVID-19 (second half of 2020) are analyzed using network analysis. The results show that there are considerable differences in ego networks of few diagnoses during these time periods warranting further investigation into the causality of such population changes.

**Keywords:** Health analytics, Network analysis, Ego networks, Exploratory data analysis (EDA), COVID-19 data analysis, Pre-term and post-term conditions, Pregnancy and childbirth, Newborn diagnoses.

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# The impact of big data on innovation and value generation in pharmaceutical sales and marketing

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**Abstract.** Using Big Data in the pharmaceutical industry is a relatively new technology, and the benefits and applications are yet to be understood. There are some cases currently being piloted, but others have already been adopted by some pharmaceutical organizations, proving the unmet need in a field that is still in its infancy.

This paper aims to understand how and if Big Data can contribute to commercial innovation, as well as future trends, investment opportunities.

Participants from 26 pharmaceutical companies participated in different focus groups where topics were grouped by individuals and evaluation areas were discussed to discover any potential connections between Big Data and Innovation in commercial pharmaceutical environments. This study used the collected data to analyze and draw conclusions about how many life sciences leaders and professionals already know about Big Data and are identifying examples and processes where Big data is supporting and generating innovation.

In addition, we were able to understand that the industry is already comfortable with Big Data, and there were some very accurate research results regarding the most pertinent application fields and key considerations moving forward.

Using the network analysis findings and the relationships and connections explained by respondents, we can reveal how Big Data and innovation are interconnected.

**Keywords:** Big Data, Digital, Pharmaceutical Industry, Focus Group, Commercial

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# Preliminary performance evaluation and verification of digital terrestrial television signal propagation

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**Abstract.** This article presents the computer simulation and field test measurement results on Channel 29 for the preliminary performance evaluation and verification of the newly-installed Lesotho digital terrestrial television network based on DVB-T2 standard following the guidelines and techniques specified by the ITU-R BT.2035-2. It evaluates, at predetermined outdoor locations for fixed and mobile reception, parameters such as received signal strength, signal quality, bit-error rate (BER) and threshold-of-visibility (ToV) together with TV signal decoding (observation of screen artefacts) for quasi error-free reception. The results indicate that at over 97% of the test sites/points at the university town of Roma, the main Berea Plateau transmitter from the capital city (Maseru) broadcasts digital television service with enough signal level and quality to be properly decoded. The measured signal strength threshold ranges above -50 dBm for good reception, -64 dBm to -50 dBm for acceptable reception and -69 dBm to -64 dBm for poor reception. With the noise floor at about -73 dBm, the minimum required C/N of around 23 dB for good reception and about 4 dB for ToV have been recorded. The relative values of minimum required respective signal strength and signal quality for ToV obtained from the set-top box are 33% and 18% for stationary reception, while they give 37% and 20% for mobile reception.

**Keywords:** DTT performance, mobile reception, signal strength, stationary reception, threshold of visibility.

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# Determinants, Barriers and Strategies of Digital Transformation Adoption in a Developing Country Covid-19 era

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**Abstract.** The purpose of this paper is to examine the determinants and strategies of digital transformation adoption (DTA) in a developing country context through the lens of price value, hedonic motivation, inherent innovativeness and technology readiness. The study also investigates the impact of COVID-19 on banks in Ghana from the managers' perspectives and provide possible solutions for banks' successful transitioning and uptake of digital transformation in a post COVID-19 era. The study was carried out using a mixed-method approach from banks in Ghana. The findings of the study revealed that customers' technology acceptance and adoption of innovation is fraught with challenges. At the same time, employees/banks struggled to adjust to new technologies during the COVID-19 pandemic. Further, the findings indicate that price value, inherent innovativeness and technology readiness were the significant factors in DTA. Conversely, hedonic motivation was an insignificant factor in a developing country context. The paper concludes with a conceptual model for emergency digital transformation to respond to future pandemics.

**Keywords:** Digital transformation, Determinants, Manager's perspective, Covid-19 banking, Developing countries, Strategies.

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# The Use of Digitization in Small and Medium-Sized Agricultural Enterprises: Evidence from the Czech Republic

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**Abstract.** This paper presents the results of the research focused on the issues of digitization of agriculture in the context of current global developments and on the need to increase the amount of food produced in order to feed the continuously growing world population. The paper aims to analyze the use of the selected digitization tools in the crop production in the Czech Republic by small and medium-sized enterprises and to evaluate that from the economic point of view. To achieve the objectives, the desk research, the analysis and evaluation of secondary sources, and the method of directed interviews with managers and employees of the selected business entity were used. The research results evidence the positives and negatives of the use of the selected digitization tools within the crop primary production and represent the basis for further research aimed at the development of economic and financial management of small and medium-sized agricultural enterprises in the context of Agriculture 4.0 concept.

**Keywords:** Digitization, Drones, GPS, Smart agriculture, Agriculture 4.0.

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# Strategic Design for Leather Tannery Industries

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**Abstract.** The province of Tungurahua in Ecuador has a participation of 76% at the national level within the leather production chain with the production of raw materials, these are used in the manufacture of 80% of footwear in the country. These production processes generate environmental problems, the greatest impact being on the water, due to the dumping of liquid waste with chemical contents in rivers, this generates bad odors, gases, smoke and polluting solid waste from this process. According to data from tanneries, approximately 88% of the raw material is transformed, while the remaining 12% is considered as waste (leather trimmings), which are used in other manufacturing processes (footwear, textile industry, leather goods and others), the chip obtained from the process is compressed and discarded. As a preventive action, a process is proposed to generate new products through the use of waste obtained from leather processing. The design methodology is the Double Diamond: discover, define, develop and deliver a new product that reuses this waste, a block of dimensions 150 x 75 x 5 mm and 300 grams of weight was obtained, which can be applied in the sector of construction and allow the transition from a linear production process to a circular process.

**Keywords:** strategic design, solid waste, new products, leather industry, leather industry.

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## **Aims and Objectives**

Published online by Institute of Certified Specialists two times a year, Journal of Digital Science (JDS) is an international peer-reviewed journal which aims at the latest ideas, innovations, trends, experiences and concerns in the field of digital science covering all areas of the scholarly literature of the sciences, social sciences and arts & humanities. The main topics currently covered include: Artificial Intelligence Research; Digital Economics, Education, Engineering, Finance, Health Care.

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