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During the first semester, a list of topics and relevant leaders will be prepared and made public. Titles and resumes must be agreed by MSc managers and teachers by the end of the second term. Projects must be completed and submitted by early September, usually on the same day as the presentation of the project - the date will be set and students will be informed of the date. The MSc MATH0068 summer project contributes 1/3 of the total MSc, with 8 taught components making up the remaining 2/3. The MATH0068 module itself consists of two components: a written project and a project presentation. The written project carries 90% of the module brand and project presentation 10%. Each year, the deadline for submitting the project is the beginning of September, and the actual date will be announced. All students must submit two solid copies of their project to the Department of Mathematics Office in Room 610 by this time. Students will also be required to send an electronic version of the project via pdf (portable document, see Adobe.com) in s.timoshin AT ucl.ac.uk. The MSc presentation will begin at 10am on the same day as the filing deadline, with the venue to be announced. Each student will be given a 20-minute time interval: 15 minutes for the presentation and 5 minutes for the questions. If necessary, data forecasting tools will be available for laptop use. Members of staff in the audience will be evaluating presentations. Students will have to stay for all presentations. Given the wide range of topics, the different focus of the projects, as well as the different aspirations of students, the rules and requirements for the MSc project are quite flexible. The project can range from extensive surveys and critiques of existing research to the development of a new model or extension of an existing one. Each project will be evaluated based on where the focus is on the effort. The original research component is not a project requirement, but will be given the proper credit if present. The student should discuss these details with his supervisor. Regardless of whether the student decides with his supervisor, there are some things that all projects should include: An introduction outlining the project and giving a clear outline of the goals of the project. Appropriate literary research with discussion. Detailed information about mathematical calculations that can be verified. Where it makes text more readable, the app can be used for some calculations. Listing any innovative computer code (C, MatLab, Mathematica, etc.) that is central to the project in the application. (Standard code, or minor changes such, should not be listed.) Clear references to all materials, as hidden as books, published magazines, the Internet, personal communication or the like. In fact, if it's not a student's idea or a job, it's Refusing to link to materials can be construed as plagiarism. The college takes a firm stand on plagiarism. If in doubt, the student should seek advice from his supervisor. Conclusions, including a summary of the project's results and, where new studies have been conducted, discuss the strengths and weaknesses of the model/method and possible improvements. There is no imposed style or specification of the word processing package used if it is able to display the final document in pdf format. Designs written by hand or written on a manual typewriter are not accepted. Some signs will be highlighted for the quality of the written work, including its readability, clarity of reasoning and general presentation. There is no limit to the word for the dissertation. Students must agree with their supervisor how often they meet for observation. The role of the manager is to help the student in the production of the project. It is expected that the student will be able to work out a significant amount of project work on his own. Students should be warned to leave enough time to write the project. Fines will be incurred on projects that will be submitted after the deadline. Each project will be marked by the student's supervisor, as well as by the second examiner. The final sign will be agreed between the two. Sort the tasks Add questions and pull requests to your advice and prioritize them along with note cards containing ideas or task lists. Plan tasks to sort the project into status columns. You can mark columns with status indicators such as Do, Progress and Made. Automating your workflow Event Startup to save time for project management - we'll move tasks to the columns you need. Keep track of the progress of tracking everything that's going on in your project, and see exactly what's changed since your last look. Share Status Each card has a unique URL, making it easy to share and discuss individual tasks with your team. Wrap up after you've finished your work, close the project board to remove it from the list of active projects. To the next project! © 2006, arizona Board of Regents Design by Jocelyn Lega Mathematical Modeling is the process of creating mathematical models in practice. A mathematical model is a system of mathematical relationships, describing the process of research or event. One applied Mathematical Modeling in sciences such as economics, sociology, ecology, physics, mechanics, chemistry, information technology, biology, etc. Essay Example on the Study Proposal on Mathematical Biology So, it is natural that every science that uses certain numbers and statistical research methods should rely on mathematical models that help them organize the results of analysis And logically. To obtain a mathematical model, the laws of ecology, ecology, rules of exact sciences, results of active and passive experiments, simulation with the help of computers. Models help specialists with process development forecasts, calculate function, control process, design systems with the required characteristics. To create a mathematical model, you can rely on any precise tool, such as probability theory, mathematical logic, abstract algebra, set theory, etc. Mathematical modeling is the most popular method of researching cybernetics. The modelling process is vital in many sciences because it helps experts organize the study in the right direction and make adequate predictions of the results achieved during the process. There are complex mathematical models used in cybernetics and programming. They are characterized by the fact that one complex model consists of several smaller models that combine their functions and data for one more complex purpose. Don't use plagiarism sources. Get a custom essay on Mathematical Research Modeling from only \$13.9/Page Get essay We'll write a custom sample essay on mathematical modeling research work specifically for you for only \$16.38 \$13 9 / Page Rent Writer We will write a custom sample essay on mathematical modeling research papers specifically for you only \$16.38 \$13.9 / Page Rent Writer Mathematical Modeling is a complex process that provides experts, which are detailed and logical models of different methods and events, related to various sciences. The student, who decided to pay attention to the topic of mathematical modeling and prepare a project on it, should think about choosing the most thought-provoking aspects and points of the question to make the proposal informative and fascinating for the professor. The young man has the opportunity to identify the problem from all sides and demonstrate a list of research methods and share predictions about research on mathematical modeling and its relevance in modern sciences. A young man who is not sure if the writing assignment is properly prepared can improve his knowledge of the style and format of writing with a free example of a mathematical modeling research proposal developed by a qualified and well-educated writer. It is reasonable to read a free proposal to study a sample of mathematical modeling on the Internet and learn about the correct structure of text, research approach and secrets of convincing writing manner. In EssayLib.com writing, you can order a special research offer on the topics of mathematical modeling, the proposal will be written from scratch. We hire the best PhDs and master's writers only to provide students with professional help with research at affordable prices. Every customer will receive Paper with timely delivery. Just visit our website and fill out an order form with all the details of the offer: Enjoy a professional research offer of a written service! This project is a problem-solving code for the issue of the B graduate math modeling competition. Fiber And Fiber Network Simulation Value Toolkit used in this article deap gurobi numpy matplotlib environmental description: ubuntu 16.04 python3.5 gurobi 8.8.8 0.1 matlab 2017 b for ubuntu vscode If you have any questions about the code, Please write zangzelin@gmail.com relevant blog for a more detailed idea: #2018年中国研究生数学建模竞赛B题 optical network modeling transfer and cost estimate 1. In 2009, the Nobel Prize in Physics was awarded to Dr. Charles K. Kao, a Chinese-British Man, for his contribution to the development of fiber optic communications, and the Nobel Committee wrote in an open letter to the public: When the Nobel Prize in Physics was announced, most of the world received this message almost instantly... Text, voice and video signals travel back and forth around the world through fiber and are produced almost instantly by tiny, convenient devices, a practice that has become a habit. Optical fibre is a prerequisite for the rapid development of the entire field of communication. Since its inception, optical transmission networks based on digital fiber optic communication technologies have built the framework of global communications for more than 50 years. From transmission within the city to transmission across the ocean, optical energy transmission network for humanity to provide high power, high reliability and low energy transfer pipeline information, the pursuit of human communication potential has become a continuous source of energy for the development of optical transmission technology. The planning and construction of an optical transmission network is a topic that operators, equipment manufacturers and the government should consider. The basic rule of optical transmission is that transmission capacity decreases under the same technical conditions as the transmission distance increases. Network planners should consider transmission distance, bandwidth, network topology, and other factors, provided resources are limited to maximize network value. In this topic, please stand at the above angle, from the bottom of the physical point of view to simulate optical transmission of communication, the development of optical transmission network planning, explore the relevant laws of optical transmission network. The content of this theme includes: simple simulation of optical transmission channels to develop an optical transmission network plan, as well as to study the value of network 3) to improve format 2 modulation. Problem-1: Optic Link simulations of modern digital transmission systems can be seen as systems that encode and transmit 0101 binary sequences, 1 binary 0 or 1 called 1 bit (bit). Whether it's a voice, a video or any type of message, it can be digitized into line 0101... binary bit sequences are encoded and modulated as a carrier signal, and then transmitted to their destination through a specific channel (information channel). The simplified model is shown in Figure 1. In optical fiber communication, optical fiber channel, optical wave transmission is a carrier of information. Inevitable noise in the channel can lead to bit errors in the binary sequence that are eventually obtained, i.e. errors. Figure 1. 1. Binary sequences usually need to pass K bits as a symbol, each with a different condition. Light transmission uses a complex amplitude of light waves to carry a signal, so different points on a complex plane can be used to perform different symbolic states, a kind of symbolic state drawn on a complex map plane called a constellation map, a dot on the map called constellation point. The MODulation of the KPSC (The quadrilateral phase of the key shear), shown in Figure 2 (a), after the channel noise and the receiver's processing, the map of the constellation of the receiving end is no longer an ideal four-point, but a diffusion. When the recipient receives the symbol, the sent symbol is defined as the nearest constellation point to the symbol. Obviously, if the noise is too high, the resulting symbol can be misj? The error ratio (Bit Error Ratio, BER) is defined as the proportion of the wrong bit to the total bit of transmission, for example, 50 characters are transmitted a total of 100 bits, one of which is underestimated as adjoining the symbol, and the error factor is 0.01 when 1 bit is wrong. BER is the most fundamental index for measuring the performance of the communication system, the use of error correction coding, as long as the pre-fix BER is below the threshold (BER tolerance point), correction of coding errors can be achieved after the correction of the error rate of zero transmission error, BER in this matter refers to the error correction code to the speed of error (preliminary correction of THE BER). Figure 2 Constellation Diagram and Noise-induced Noise Pattern 3 Corresponding Pattern of Signal and Noise Detection In Figure 3, the ideal point of the constellation is represented by the resulting symbol, and noise (1) noise is usually subject to normal distribution with an average of 0. The difference in noise is equal to the average noise power and is defined as (2), where N is the total number of characters transmitted. The average signal power is defined as the average square of the absolute value of the transmission symbol: (3) the ratio of signal power to noise is defined as signal-to-noise ratio (Signal-to-Noise Ratio, SNR), (4) dB is typically used as an SNR unit in engineering, defined as (5) increased tenfold to plus 10 dB, reduced by 0.5 times to minus 3d. In this matter, powertrains are combined into milliwatts (MW), and real and imaginary units of the constellation map are. Optical transmission chains are cascaded from several identical spans. As shown in Figure 4, tens of kilometers of fiber and amplifier make up the span. For every 15 km transmitted, the optical energy is extinguished by half, and after the transfer of fiber, the optical energy must be compensated by an amplifier. At the same time, both signal and noise Simultaneously, the amplifier also introduces spontaneous radiation noise, which is a constant Planck (), which is an optical wave frequency (which can be set up to 193.1 GHz), B is bandwidth (set up to 50 GHz), NF is a noise index (can be set at 4), get to compensate for the increase in power corresponding to the time. On the other hand, as a means of transmission, the non-linear effect of optical fiber itself will inject noise equivalent. Its equivalent noise power is roughly squared with incoming power glass, and non-linear noise when the fiber power is 1 mW is about 2/3 of the noise of a single amplifier. Spontaneous radiation amplifier noise and non-linear optical fiber noise are an additional noise. Non-linear noise is superimposed at the beginning of each range, amplifier noise is superimposed at the end of each range, and the signal-to-noise ratio remains the same for the span. The noise imposed on each span does not depend on each other. Figure 4. 4. Subsold-1) Pre-correction of error frequency and calculation of signal-to-noise ratio, constellation coding distribution pattern is also known as modulation format, for this modulation format BER and SNR are one-to-one correspondence, predictive threshold BER corresponding to SNR as a point of tolerance of SNR. The three modulation formats and coding methods shown in Figure 5 are given (the neighboring points of the constellation are equally distant), each symbol and other probabilities appear, respectively, under the name PSK, 8:00 (Square Modulation of amplitude, SAM), 16zAM. Please give a relationship curve between BER and SNR, what is the SNR tolerance point at BER-0.02? Figure 5 Coding Scheme in three Sub-problem-2 modulation formats) optical communication performance calculation What is the maximum transmission distance (the number of spans per spanx given in figure 5, when the transmission distance of one flyby is 80 km and 100 km, with an error rate of 0.02 as a threshold? 3. Issue-2 Optical Transmission Network Planning Table 1 gives three typical optical transmission equipment parameters for further optimization after upgrade. Given that the purpose of the network is to connect more people more fully together, we define the value of the network as follows: 1) Each link, directly connecting the two cities/region, defined as a connection, and the value of each connection is defined as the product of the transferable power and population of the connecting area (take the population of the two regions) The value of the product is 0.5 times 2) the value of the network is the weighted average value of all connections and (6) in Figure 5, the three cities of Beijing, Nanjing and Shanghai, for example, if they are related to each other, depending on the distance from the city can be derived from the potential that can be derived from. If each link weighs 1, then the population calculates the value of the network (Network Value, NV) as (7), where m represents a million people (million), the number of connections to the network is 3. However, due to a lack of resources, the network often prevents each pair of nodes from connecting directly, but can be connected through intermediate nodes. For example, figure 5 b has 2 Internet connections, and transit between Beijing and Nanjing is required via Shanghai. If only half of the capacity (100Gb/s) is retained for transmission between Beijing and Shanghai, and the other half is used to transmit the signal from Nanjing to Beijing (100Gb/s), the direct bandwidth between Nanjing and Shanghai will be reduced to 300Gb/s, at which point the network value is (8) and there may be several connections between the two nodes as needed. Figure 6 Three-part Network Chart Table 1 Transfer Distance In various transmission formats Singlewave transmission Maximum transmission power of 100 GB/s 3000 km 8 Tb/s 200 Gb/s 1200 16 Tb/s s 400 Gb/s 600 km 32 T/s Ask your team to consider the value and demand for the City Group of China in Figure 6 to develop optical transmission network planning, a total of 12 regions (of which Beijing/Tianjin, Shenzhen/Guangzhou are treated according to 1 region), sub-issue-1: If the number of connections increased from 16 to 33, do not consider intermediate nodes, give two network planning and its value. What is the maximum cost of the network? Sub-distribution-2: If there are intermediate nodes and multiple connections between the two nodes, solve sub-protection-1 and give bandwidth distribution to all intermediate nodes, assuming that each connection capacity can be distributed arbitrarily, as long as the total capacity does not exceed table 1. What is the impact of expansion from city to province? (Population, please find it online) Figure 7 City Group Issue-3 Improving the Constellation Chart First issue shows that when the prior CORRECTION of the BER remains unchanged, the decrease in the point of tolerance of SNR can improve the system's ability to tolerate noise, thereby extending the overall length of the link. Try to randomly change the position, number, or probability of each constellation point in the 16-AM scenario to study modulation patterns that produce lower SNR tolerance points than 8-AM in Figure 5 (equal distance between neighboring constellation points)? The entropy of the modulation format should be maintained at 3bit. Information entropy is defined as: (9) the probability that each state of the symbol will appear, N is the number of states. In the case of the equal probability shown in Figure 5, the information entropy of the PSC, 8-AM and 16-AM is 2bits, 3bits and 4bits respectively. 3bit and 4bit. word print to pdf high resolution

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