

Exercícios do Minicurso *Science Research Writing*

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1 Introdução

1.1 Texto I

Title: The synthesis of flexible polymer blends from polylactide and rubber¹

Introduction:

1 Polylactide (PLA) has received much attention in recent years due to its biodegradable properties, which offer important economic benefits. **2** PLA is a polymer obtained from corn and is produced by the polymerisation of lactide. **3** It has many possible uses in the biomedical field¹ and has also been investigated as a potential engineering material. ^{2,3} **4** However, it has been found to be too weak under impact to be used commercially.⁴

5 One way to toughen polymers is to incorporate a layer of rubber particles⁵ and there has been extensive research regarding the rubber modification of PLA. **6** For example, Penney et al. showed that PLA composites could be prepared using blending techniques⁶ and more recently, Hillier established the toughness of such composites.⁷ **7** However, although the effect of the rubber particles on the mechanical properties of copolymer systems was demonstrated over two years ago,⁸ little attention has been paid to the selection of an appropriate rubber component.

8 The present paper presents a set of criteria for selecting such a component. **9** On the basis of these criteria it then describes the preparation of a set of polymer blends using PLA and a hydrocarbon rubber (PI). **10** This combination of two mechanistically distinct polymerisations formed a novel copolymer in which the incorporation of PI significantly increased flexibility.

Questões

Em relação ao Texto I, solicita-se:

- a) Cite duas formas de como afirmar que um determinado tópico de pesquisa é útil ou relevante.
- b) Transforme a sentença 1 para o *Present Simple*. Comente a diferença.
- c) Qual é a função do *Present Simple* na sentença 2?
- d) Uma das estratégias para iniciar uma introdução é observar o título. É útil para os leitores definir as palavras-chave do título. Assim escreva uma primeira frase para a introdução do seguinte título “Consensus and Cooperation in Networked Multi-Agent Systems”² Em casa, compare com a primeira frase escrita pelo autor.
- e) Quais artigos devem ser citados na revisão de literatura? Cite alguns procedimentos para ajudar nessa escolha.

¹Onde não for mencionado diferentemente, os textos foram tirados da referência básica do minicurso: H. Glasman-Deal, *Science Research Writing for Non-Native Speakers of English*, Imperial College London, (2010).

²R. Olfati-Saber, J. A. Fax, and R. M. Murray, Proc. IEEE 95, 215 (2007).

- f) Transforme a sentença 6 para o Present Perfect. Esses dois tempos verbais são os mais empregados para revisão de literatura. Quando há alguma verdade/fato amplamente aceito pode-se também usar o *Present Simple*.
- g) Discuta a relevância de se apresentar uma citação na sentença 4, momento em que o autor define o problema a ser investigado.
- h) É importante apresentar a revisão de literatura, ou seja os artigos que apresentarão quais são as principais pesquisas no momento, em uma determinada ordem. Em geral, há três modos de ordenar:
- Cronológico.
 - Diferentes. abordagens/teorias/modelos.
 - Do geral para o mais específico.

Em sua opinião, qual foi o modo de ordenar utilizado nesta introdução? Que pista você utilizou para identificar isso?

- i) Identifique quais sentenças desempenham funções semelhantes entre o texto desta questão e o seguinte parágrafo:

1 Many real-life systems involve a mixed combination of continuous and discrete variables. **2** In this work, we focus on systems with binary responses that depend on continuous time predictors. **3** Binary responses are commonly studied in many situations such as the presence or absence of a disease, granting a loan, or detecting the failure of a process, system, or product [27, 28]. **4** However, the use of traditional regression techniques to deal with systems with a dichotomous response variable may not be appropriate given that they are sensitive to outliers and the distribution of the classes [27].³

1.2 Texto II

Title: A fast and elitist multiobjective genetic algorithm: NSGA-II⁴

Introduction:

The presence of multiple objectives in a problem, in principle, gives rise to a set of optimal solutions (largely known as Pareto-optimal solutions), instead of a single optimal solution. In the absence of any further information, one of these Pareto-optimal solutions cannot be said to be better than the other. This demands a user to find as many Pareto-optimal solutions as possible. Classical optimization methods (including the multicriterion decision-making methods) suggest converting the multiobjective optimization problem to a single-objective optimization problem by emphasizing one particular Pareto-optimal solution at a time. When such a method is to be used for finding multiple solutions, it has to be applied many times, hopefully finding a different solution at each simulation run.

Over the past decade, a number of multiobjective evolutionary algorithms (MOEAs) have been suggested [1], [7], [13],[20], [26]. The primary reason for this is their ability to find multiple Pareto-optimal solutions in one single simulation run. Since evolutionary algorithms (EAs) work with a

³J. R. Ayala Solares, H.-L. Wei, and S. A. Billings, *Neural Comput. Appl.* 1 (2017).

⁴K. Deb, A. Pratap, S. Agarwal, and T. Meyarivan, *IEEE Trans. Evol. Comput.* 6, 182 (2002).

population of solutions, a simple EA can be extended to maintain a diverse set of solutions. With an emphasis for moving toward the true Pareto-optimal region, an EA can be used to find multiple Pareto-optimal solutions in one single simulation run. The nondominated sorting genetic algorithm (NSGA) proposed in [20] was one of the first such EAs. Over the years, the main criticisms of the NSGA approach have been as follows.

- 1) *High computational complexity of nondominated sorting*: The currently used nondominated sorting algorithm has a computational complexity of $O(MN^3)$ (where M is the number of objectives and N is the population size). This makes NSGA computationally expensive for large population sizes. This large complexity arises because of the complexity involved in the nondominated sorting procedure in every generation.
- 2) *Lack of elitism*: Recent results [25], [18] show that elitism can speed up the performance of the GA significantly, which also can help preventing the loss of good solutions once they are found.
- 3) *Need for specifying the sharing parameter σ_{share}* : Traditional mechanisms of ensuring diversity in a population so as to get a wide variety of equivalent solutions have relied mostly on the concept of sharing. The main problem with sharing is that it requires the specification of a sharing parameter (σ_{share}). Though there has been some work on dynamic sizing of the sharing parameter [10], a parameter-less diversity-preservation mechanism is desirable.

In this paper, we address all of these issues and propose an improved version of NSGA, which we call NSGA-II. From the simulation results on a number of difficult test problems, we find that NSGA-II outperforms two other contemporary MOEAs: Pareto-archived evolution strategy (PAES) [14] and strength- Pareto EA (SPEA) [24] in terms of finding a diverse set of solutions and in converging near the true Pareto-optimal set.

Constrained multiobjective optimization is important from the point of view of practical problem solving, but not much attention has been paid so far in this respect among the EA researchers. In this paper, we suggest a simple constraint-handling strategy with NSGA-II that suits well for any EA. On four problems chosen from the literature, NSGA-II has been compared with another recently suggested constraint-handling strategy. These results encourage the application of NSGA-II to more complex and real-world multiobjective optimization problems.

In the remainder of the paper, we briefly mention a number of existing elitist MOEAs in Section II. Thereafter, in Section III, we describe the proposed NSGA-II algorithm in details. Section IV presents simulation results of NSGA-II and compares them with two other elitist MOEAs (PAES and SPEA). In Section V, we highlight the issue of parameter interactions, a matter that is important in evolutionary computation research. The next section extends NSGA-II for handling constraints and compares the results with another recently proposed constraint-handling method. Finally, we outline the conclusions of this paper.

Questões

Em relação ao Texto II, encontre os seguintes elementos:

- a) Os tempos verbais utilizados. Explique a função de cada um.
- b) As estratégias que o autor utilizou para dar continuidade ao texto.
- c) Os termos utilizados para expressar relações entre as sentenças.
- d) Qual foi a estratégia do autor para identificar o *gap* e apresentar esse artigo ao leitor?

2 Metodologia

2.1 Texto III

Methodology

1 The current investigation involved sampling and analysing six sites to measure changes in groundwater chemistry. **2** The sites were selected from the London Basin area, which is located in the south-east of England and has been frequently used to interpret groundwater evolution.^{2,3,4}

3 A total of 18 samples was collected and then analysed for the isotopes mentioned earlier. **4** Samples 1–9 were collected in thoroughly-rinsed 25 ml brown glass bottles which were filled to the top and then sealed tightly to prevent contamination. **5** The filled bottles were shipped directly to two separate laboratories at Reading University, where they were analysed using standard methods suitably miniaturised to handle small quantities of water.⁵

6 Samples 10–18 were prepared in our laboratory using a revised version of the precipitation method established by the ISF Institute in Germany.⁶ **7** This method obtains a precipitate through the addition of $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$; the resulting precipitate can be washed and stored easily. **8** The samples were subsequently shipped to ISF for analysis by accelerator mass spectrometry (AMS). **9** All tubing used was stainless steel, and although two samples were at risk of CFC contamination as a result of brief contact with plastic, variation among samples was negligible.

Questões

Em relação ao Texto III, responda as seguintes questões.

- Relacione sentença 1 com a seguinte frase: *Show your reader the wall before you begin to examine the bricks.*
- Explique o sentido dos três tempos verbais utilizados na sentença 2.
- Qual a diferença dos tempos verbais entre as sentenças 6 e 7?
- Qual o papel das palavras *although* e *negligible* na sentença 9.

2.2 Texto IV

Methodology for synchronization⁵

1 The chaotic systems are very sensitive to the initial conditions and generate an apparently random behavior, being one of its main characteristics. **2** These properties of chaos provide a development to new applications in cryptography since the long-term predictions of chaotic systems are complex to identify. **3** Chaotic systems have the peculiarity that they can be synchronized. **4** The chaotic systems can be solved in different ways; the use of numerical methods gives us an incredible advantage which discretizes the system through iterations, making use of Euler and Runge-Kutta method among others.

5 The process presented in this paper is first to synchronize a chaotic system, when the synchronization is successful, the next step is to transmit an image, for this case is an RGB image as a signal, and then mix this signal with chaotic signal to secure the image and compare the correlation results to probe identity. **6** Figure 1 shows the diagram of the methodology.

⁵[1] A. Melendez-Cano, et al., in 2017 Int. Conf. Mechatronics, Electron. Automot. Eng. (IEEE, 2017), pp. 49–54.

7 There are different types of synchronization for chaotic systems, for this paper the mathematical procedure is done to synchronize any system of any order with the OPCL method. 8 OPCL is a type of heterogeneous synchronization, it allows obtaining the master and the slave parameters, and we employed OPC in order to synchronize the Sprott's collection.

Questões

Em relação ao Texto IV, responda as seguintes questões.

- a) Por que as sentenças 1 a 4 usam o *Present Simple*?
- b) O que você faria para aprimorar as sentenças de 1 a 4 de acordo com o que foi visto no modelo?
- c) Compare os tempos verbais das sentenças 7 e 8. Você sugere alguma melhoria?

2.3 Texto V

Title: An Approach to the Preparation of Chicken

Introduction:

Chicken preparation techniques are used in a range of applications both in homes and in restaurants. Chicken is easily available and can be locally produced in most areas; in addition it is easily digested and low in calories.¹

Since Dundee's pioneering work reporting the 'natural' method of chicken preparation (Dundee et al., 1990) in which the chicken was killed and then eaten raw with salt, there have been significant innovations. Much work has been carried out in France in relation to improving the method of slaughtering chickens,² whereas in the USA researchers have concentrated on improving the size of the bird.^{3,4} The 'natural' method is widely used since the time required for the process is extremely short; however, some problems remain unsolved. The flavour of chicken prepared using the Dundee method is often considered unpleasant⁵ and there is a well-documented risk of bacterial infection⁶ resulting from the consumption of raw meat.

The aim of this study was to develop a preparation method that would address these two problems. In this report, we describe the new method, which uses seasoning to improve the flavour while heating the chicken in order to kill bacteria prior to eating.

Questões

Em relação ao Texto V, faça:

- a) Observe os tempos verbais da Introdução. Apesar de ser um texto fictício, estão condizentes com a metodologia empregada?
- b) Escreva uma metodologia de cerca de 200 palavras (pode ser feito em Português)

3 Resultados

3.1 Texto VI

Results

1 Data obtained in previous studies^{1,2} using a fixed on-site monitor indicated that travel by car resulted in lower CO exposure than travel on foot. **2** According to Figo et al. (1999), the median exposure of car passengers was 11% lower than for those walking.² **3** In our study, modelled emission rates were obtained using the Traffic Emission Model (TEM), a CO-exposure modelling framework developed by Ka.³ **4** Modelled results were compared with actual roadside CO concentrations measured hourly at a fixed monitor. **5** Figure 1 shows the results obtained using TEM.

6 As can be seen, during morning peak-time journeys the CO concentrations for car passengers were significantly lower than for pedestrians, which is consistent with results obtained in previous studies.^{1,2} **7** However, the modelled data were not consistent with these results for afternoon journeys. **8** Although the mean CO concentrations modelled by TEM for afternoon journeys on foot were in line with those of Figo et al., a striking difference was noted when each of the three peak hours was considered singly (Fig. 2). **9** It can be observed that during the first hour (H1) of the peak period, journeys on foot resulted in a considerably lower level of CO exposure. **10** Although levels for journeys on foot generally exceeded those modelled for car journeys during H2, during the last hour (H3) the levels for journeys on foot were again frequently far lower than for car journeys.

11 A quantitative analysis to determine modelling uncertainties was applied, based on the maximum deviation of the measured and calculated levels within the considered period. **12** Using this approach, the uncertainty of the model prediction for this study slightly exceeds the 50% acceptability limit defined by Jiang.⁷ **13** Nevertheless, these results suggest that data obtained using TEM to simulate CO exposures may provide more sensitive information for assessing the impact of traffic management strategies than traditional on-site measurement.

Questões

Em relação ao Texto VI, faça:

- Como é feita a transição entre a indicação de resultados de outros trabalhos com o aqueles apresentados pelo(s) autore(s)?
- Qual é o objetivo de *which is consistent with results obtained in previous studies* na sentença 6?
- Não se usa ponto de exclamação em texto científico. No lugar disso, o que é feito na sentença 8?
- Não seja tímido em escrever apenas números. Fale o que você acredita. Veja um exemplo *the SFS results are in very good agreement with their FE counterparts*. Use esse exemplo e reescreva a sentença 12.

3.2 Texto VII

Experimental Results⁶

1 Table 1 summarizes the chaotic systems primarily examined in this paper. **2** The differential equations were solved numerically using a fourth-order Runge-Kutta integration with a step size equal

⁶[M. T. Rosenstein et al., Phys. D Nonlinear Phenom. 65, 117 (1993).

to Δt as given in table 1. **3** For each system, the initial point was chosen near the attractor and the transient points were discarded. **4** In all cases, the x -coordinate time series was used to reconstruct the dynamics. **5** Fig. 2 shows a typical plot (solid curve) of $(\ln d_j(i))$ versus $i\Delta t^{\#2}$; the dashed line has a slope equal to the theoretical value of λ_1 . **6** After a short transition, there is a long linear region that is used to extract the largest Lyapunov exponent. **7** The curve extract the largest Lyapunov exponent. **8** The curve saturates at longer times since the system is bounded in phase space and the average divergence cannot exceed the “length” of the attractor,

9 The remainder of this section contains tabulated results from our algorithm under different conditions. **10** The corresponding plots are meant to give the reader qualitative information about the facility of extracting λ_1 , from the data. **11** That is, the more prominent the linear region, the easier one can extract the correct slope. (Repeatability is discussed in section 5.2.)

Questões

Em relação ao Texto VII, faça:

- a) Qual foi a estratégia para iniciar a seção de resultados?
- b) Em que sentença os autores retomam a metodologia?
- c) Que expressões são utilizadas para qualificar os resultados? Em quais sentenças?

4 Conclusão

4.1 Texto VIII

Título: Cognitive-behavioural stress management (CBSM) skills and quality of life in stress-related disorders.

Discussion

1 Prior work has documented the effectiveness of psychosocial intervention in improving quality of life (QoL) and reducing stress in patients suffering from various disorders; Epstein,¹⁸ for example, reports that orthopedic patients participating in a two week multimedia intervention programme improved across several QoL indices, including interpersonal conflict and mental health. **2** However, these studies have either been short-term studies or have not focused on patients whose disorder was stress-related. **3** In this study we tested the extent to which an extended three month stress management programme improved QoL among a group of patients being treated for stress-related skin disorders such as eczema.

4 We found that in virtually all cases, participation in our three-month stress management programme was associated with substantial increases in the skills needed to improve QoL. **5** These findings extend those of Kaliom, confirming that a longer, more intensive period of stress-management training tends to produce more effective skills than when those skills are input over a shorter period via information transfer media such as leaflets and presentations (Kaliom et al., 2003). **6** In addition, the improvements noted in our study were unrelated to age, gender or ethnic background. **7** This study therefore indicates that the benefits gained from stress-management intervention may address QoL needs across a wide range of patients. **8** Most notably, this is the first study to our knowledge to investigate the effectiveness of extended psychosocial intervention in patients whose disorder is itself

thought to be stress-related. **9** Our results provide compelling evidence for long-term involvement with such patients and suggest that this approach appears to be effective in counteracting stress that may exacerbate the disorder. **10** However, some limitations are worth noting. **11** Although our hypotheses were supported statistically, the sample was not reassessed once the programme was over. **12** Future work should therefore include follow-up work designed to evaluate whether the skills are retained in the long term and also whether they continue to be used to improve QoL.

Questões

Em relação ao Texto VIII, faça:

- a) A primeira sentença da conclusão, em geral, pode apresentar 3 perspectivas: i) revisitar a introdução; ii) revisitar a metodologia; iii) revisitar os resultados. Compare o início da conclusão do Texto VIII com o seguinte trecho. Quais são suas observações?

Conclusion

We have proposed a computationally fast and elitist MOEA based on a nondominated sorting approach. On nine different difficult test problems borrowed from the literature, the proposed NSGA-II was able to maintain a better spread of solutions and converge better in the obtained nondominated front compared to two other elitist MOEAs—PAES and SPEA.⁷

- b) Quais são os tempos verbais utilizados no Texto VIII? Comente.
- c) O seguinte texto é uma revisão real de um artigo proposto a revista *IET Control Theory & Applications* submetido em 2017 por Nepomuceno, Lacerda e Martins.

This paper proposed a structure selection method to recover static nonlinearities without losing chaotic characteristics. The main contribution of this work is introducing an interval predictor model (IPM) for model structure selection and designing a convex combination strategy to enhance the dynamic behaviors, which in my opinion remains relative weak. Maybe the authors need to highlight the possible novelties of this work.⁸

Que parte do Texto VIII pode ser utilizada para evitar esse tipo de crítica por parte dos revisores?

5 Resumo

5.1 Texto IX

Abstract

1 The speed of sound in a fluid is determined by, and therefore an indicator of, the thermodynamic properties of that fluid. **2** The aim of this study was to investigate the use of an ultrasonic cell to determine crude oil properties, in particular oil density. **3** An ultrasonic cell was constructed to measure the speed of sound and tested in a crude oil sample. **4** The speed of sound was measured at temperatures between 260 and 411 K at pressures up to 75 MPa. **5** The measurements were shown to lead to an accurate determination of the bubble point of the oil. **6** This indicates that there is a possibility of obtaining fluid density from sound speed measurements and suggests that it is possible to measure

⁷K. Deb, A. Pratap, S. Agarwal, and T. Meyarivan, IEEE Trans. Evol. Comput. 6, 182 (2002).

⁸Reviewer 1 - Revisão emitida pelo Editor Chefe, Dr. James Lam, em 9 de janeiro de 2018.

sound absorption with an ultrasonic cell to determine oil viscosity.

Questões

Em relação ao Texto IX, faça:

- a) Caso seja necessário citar uma referência no Resumo, em sua opinião como isso pode ser feito. Exemplifique.
- b) Em que parte do texto, pode ser observada expressões que ajudam a destacar a contribuição do artigo?

5.2 Texto X

Abstract

1 This study investigated the use of a novel water-soluble polymer blend as a coating to control drug release. **2** It was found that using a blend of methylcellulose and a water-soluble copolymer significantly slowed the release rate of ibuprofen compounds in vitro and allowed for a more consistent release rate of 10–20% per hour.

Questões

Em relação ao Texto X, faça:

- a) O seguinte resumo é bastante incomum. Por outro lado, é um artigo altamente citado. Comente.

Título: PRIMES is in P⁹

Abstract: We present an unconditional deterministic polynomial-time algorithm that determines whether an input number is prime or composite.

- b) Seguente o modelo do Texto X, elabore um resumo para o Texto V. Proponha um novo título.

6 Artigo de interesse

Em relação ao artigo que você escolheu, faça

1. Faça um *skimming* no artigo: Título, resumo, primeira frase de cada parágrafo. Gaste no máximo 10 min. Qual foi sua impressão do artigo?
2. Em cada grande parte do texto, anote quais os tempos verbais que foram utilizados.
3. Identifique qual é o *gap* do artigo? De que forma isso foi abordado?
4. Qual é a *novelty* do artigo? Como e em que partes isso foi apresentado no texto?

⁹M. Agrawal, et al., Ann. Math. 160, 781 (2004).