

Inteligenta Artificiala in Educatie: de la abandonarea studiilor la prezicerea certificatelor

Professor AI Cristea





Long-term research in AIED

- AIED 2022: The 23rd International Conference on Artificial Intelligence in Education, 27-31 July, Durham University, UK <u>AIED2022 (durham.ac.uk)</u>
- EDM 2022 is the 15th iteration of the Educational Data Mining Conference Series EDM2022 (durham.ac.uk)
- Intelligent Tutoring Systems 17th International Conference, ITS 2021, Virtual Event, June 7–11, 2021, Proceedings | Alexandra I. Cristea | Springer
- Other conferences also target this area: EC-TEL, ICALT, to name but a few







Dropout study – funded by Saudi government

Is MOOC Learning Different for Dropout Learners? A Visually-driven, Multi-granularity Approach

Alamri, A., Sun, Z., Cristea, A.I., Senthilnathan, G., Shi, L., Stewart, C. (2020). Is MOOC Learning Different for Dropouts? A Visually-Driven, Multi-granularity Explanatory ML Approach. In: Kumar, V., Troussas, C. (eds) Intelligent Tutoring Systems. ITS 2020. Lecture Notes in Computer Science(), vol 12149. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-49663-0_42</u>



Dropout prediction – funded by Saudi government

MOOC next week dropout prediction: weekly assessing time and learning patterns

Alamri, A., Sun, Z., Cristea, A.I., Stewart, C., Pereira, F.D. (2021). MOOC *Next Week* Dropout Prediction: Weekly Assessing Time and Learning Patterns. In: Cristea, A.I., Troussas, C. (eds) Intelligent Tutoring Systems. ITS 2021. Lecture Notes in Computer Science(), vol 12677. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-</u> 80421-3_15

Research Questions

- Are there differences in the prediction of weekly dropout and whole course dropout?
- Will the weekly predictive model be more accurate after considering student jumping behaviours and catch-up learning patterns during the course?

Alamri, A., Sun, Z., Cristea, A.I., Stewart, C., Pereira, F.D. (2021). MOOC *Next Week* Dropout Prediction: Weekly Assessing Time and Learning Patterns. In: Cristea, A.I., Troussas, C. (eds) Intelligent Tutoring Systems. ITS 2021. Lecture Notes in Computer Science(), vol 12677. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-80421-3_15</u>

JANET Project (funded by Weizmann Institute@Israel)

Learning Environment - PeTeL

Personalized Teaching and Learning

- 3 modules: Physics, Chemistry, Biology
- Used by ~1,000 teachers, 20,000 students – all of Israel
- During 2019-2020 school year: less than 3% response rate

The challenge:

how to enhance teachers' motivation to provide feedback about activities they used in class? Yacobson, E., Toda, A., Cristea, A.I., Alexandron, G. (2021). Encouraging Teacher-Sourcing of Social Recommendations Through Participatory Gamification Design. In: Cristea, A.I., Troussa (eds) Intelligent Tutoring Systems. ITS 2021. Lecture Notes in Computer Science, vol 12677. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-80421-3_46</u> https://edarxiv.org/qx4vp/download?format=pdf



Urgent intervention (funded by Saudi gov)

• RQ. Can we predict learners who may drop out and identify their need for intervention from their most recent comments?

> Alrajhi, L., Alamri, A., Cristea, A.I. (2022). Intervention Prediction in MOOCs Based on Learners' Comments: A Temporal Multi-input Approach Using Deep Learning and Transformer Models. In: Crossley, S., Popescu, E. (eds) Intelligent Tutoring Systems. ITS 2022. Lecture Notes in Computer Science, vol 13284. Springer, Cham. <u>https://doi.org/10.1007/978-3-031-09680-8_22</u>



Exploring Bayesian Deep Learning for Urgent Instructor Intervention Need in MOOC Forums

> Yu, J., Alrajhi, L., Harit, A., Sun, Z., Cristea, A.I., Shi, L. (2021). Exploring Bayesian Deep Learning for Urgent Instructor Intervention Need in MOOC Forums. In: Cristea, A.I., Troussas, C. (eds) Intelligent Tutoring Systems. ITS 2021. Lecture Notes in Computer Science(), vol 12677. Springer, Cham. https://doi.org/10.1007/978-3-030-80421-3_10

> > Funder: Durham University

Agent-based Classroom Environment Simulation: the Effect of Disruptive Schoolchildren's Behaviour versus Teacher

Alharbi, K., Cristea, A.I., Shi, L., Tymms, P., Brown, C. (2021). Agent-Based Classroom Environment Simulation: The Effect of Disruptive Schoolchildren's Behaviour Versus Teacher Control over Neighbours. In: Roll, I., McNamara, D., Sosnovsky, S., Luckin, R., Dimitrova, V. (eds) Artificial Intelligence in Education. AIED 2021. Lecture Notes in Computer Science(), vol 12749. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-78270-2_8</u>







Model Variables

Learning Students الطلاب المتعلمون: 0.00 Disruptive Students الطلاب المشاغبون: Current school day البوم الدراسي الحالي

Alharbi, K., Cristea, A.I., Shi, L., Tymms, P., Brown, C. (2021). Agent-Based Classroom Environment Simulation: The Effect of Disruptive Schoolchildren's Behaviour Versus Teacher Control over Neighbours. In: Roll, I., McNamara, D., Sosnovsky, S., Luckin, R., Dimitrova, V. (eds) Artificial Intelligence in Education. AIED 2021. Lecture Notes in Computer Science(), vol 12749. Springer, Cham. <u>https://doi.org/10.1007/978-3-030-78270-</u> 2_8

Online Judge – LA (CAPES: Brazil funding)





Pereira, F. D., Oliveira, E. H., Oliveira, D. B., Cristea, A. I., Carvalho, L. S., Fonseca, S. C., Toda, A., & Isotani, S. (2020). Using learning analytics in the Amazonas: Understanding students' behaviour in introductory programming. *British Journal of Educational Technology*, *51*(4), 955–972. <u>https://doi.org/10.1111/bjet.12953</u>

https://bera-journals.onlinelibrary.wiley.com/doi/full/10.1111/bjet.12953









<TechUPWOMEN> Our journey

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Alexandra I. Cristea and Sue Black Department of Computer Science Durham University

https://techupwomen.org



Research Questions

O. T. Aduragba, J. Yu, A. I. Cristea, M. Hardey and S. Black, "Digital Inclusion in Nothern England: Training Women from Underrepresented Communities in Tech: A Data Analytics Case Study," 2020 15th International Conference on Computer Science & Education (ICCSE), Delft, Netherlands, 2020, pp. 162-168, doi: 10.1109/ICCSE49874.2020.9201693.

RQ1: Different levels of sentiment expressiveness in public and private communication channels

RQ2: Connections between the sentiment within a private communication channel to a publicly accessed social media channel such as Twitter

RQ3. How can we use data analytics to measure retraining programmes for women in tech(nology), during the actual intervention?

RQ4. How can special intervention methods to support women transition into technology roles?

J. Yu et al., "Temporal Sentiment Analysis of Learners: Public Versus Private Social Media Communication Channels in a Women-in-Tech Conversion Course," 2020 15th International Conference on Computer Science & Education (ICCSE), Delft, Netherlands, 2020, pp. 182-187, doi: 10.1109/ICCSE49874.2020.9201631.



https://techupwomen.org





Towards Designing Profitable Courses: Predicting Student Purchasing Behaviour in MOOCs Mohammad Alshehri,

Mohammad Alshehri, Ahmed Alamri, Alexandra Cristea, Craig Stewart

Department of Computer Science, Durham University

Expanding from online learning: Pika-Pika, <u>co</u>llaboration with Shinshu Univ., <u>Japan</u>



Adaptation/Personalisation in VR



03/Ju1/2022 18:34:40] "POST //recommendation H /Jul/2022 18:34:51] "POST //recommendation H 2022 18:34:57] "POST //recommendation HT O 🛱 🕐 🏟 🖁 📰 💟 🔽 🔹 💭 🧔 🗐 🎱 🛆 🚱 🔊 🖉 🖉 🖉 Big 1834

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The code for monitoring the heartrate and connection to the VR is run separately

The textual tips, as well as the size of the candle flame change to match progress



AI: Top Down versus Bottom Up

Educators, Psychologists, Teachers,

etc.

Educational Adaptive/Personalised System

(Student) usage data



Open questions

- LA ~ DA?
- Where does pedagogy have a place?
- How about motivational theories?
- Behavioural psychology?
- VR/ AR?



Any Questions... Just Ask!



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