

## Degree Project Management Tool

# MSc Projects - 20/21

## Collaborative Storytelling with ML/AI

**Principal Goal:** To design and implement a system for a Human-Computer collaborative generation of a story based on ML/AI, using images and/or text

This project has been proposed by [Aurora Constantin \(Aurora.Constantin@ed.ac.uk\)](mailto:Aurora.Constantin@ed.ac.uk). You are currently interested in being a **supervisor** for this project.

There is now a significant body of Machine Learning work for the captioning of one or a set of images, and the generation of stories [1]. This project aims to explore the use of these and other Artificial Intelligence (AI) or Machine Learning (ML) technologies for collaborative storytelling between a Human (or more?) and a computer. Its main outcome is intended to be a prototype of a system that will attempt such a collaboration. For example, the system could help/assist parents or practitioners working with children with Autism Spectrum Conditions (ASC)[2] write Social Stories™ [3] - short stories with a specific style and format that describe a situation, a social skill or a concept in a meaningful way for individuals with ASC. You may want to develop this idea starting from the previous work [4].

Another example: the system could help children's narrative development based on the Propp's morphology – a model of narrative for a children's story authoring tool, with the potential to give children a powerful mental model with which to construct stories [5]. To get more inspiration in this sense you may want to start from the work described in [6] and [7].

However, there is no hard limit on what can be explored. The student is encouraged to be creative. They can build their system from scratch or improve existing systems.

There is a lot of work out there for generating text or images, but some good starting points are:

Image to Text: Let Your Photos Talk [8] and "Show, Reward and Tell" [9]

Text to Image: Character-Preserving Coherent Story Visualization [10] and StoryGAN [11]

Text to Text: PlotMachines [12], Counterfactual Story Reasoning and Generation [13]

Image to Image (discovered models are of less obvious direct use): "Tell, Draw, and Repeat" [14].

*Note:* The system might be built on the repeated use of some combination of text-to- image, text-to-text, image-to-image, or image-to-text models with the minimum of a starting user seed as input [Easy] or waiting for input [Moderate]. Further ideas on letting the AI/ML model adapt based on previous interactions can be explored [Hard].

If more than one student is assigned, then the project may be collaborative, split by Machine Learning task. Alternatively, each student can choose their own direction and develop independent projects.

The student(s) will be also supervised by Dr Pavlos Andreadis. Please, visit also ML/AI for Collaborative Storytelling proposed by Dr Pavlos Andreadis.

- 1 Abigail See, Aneesh Pappu, Rohun Saxena, Akhila Yerukola, Christopher D. Manning, Do Massively Pretrained Language Models Make Better Storytellers?, CONLL 2019 (<https://paperswithcode.com/paper/do-massively-pretrained-language-models-make> (<https://paperswithcode.com/paper/do-massively-pretrained-language-models-make>)).
- 2 American Psychiatric Association (APA). (2013). Diagnostic and statistical manual of mental disorders (5th ed.). <http://dx.doi.org/10.1176/appi.books.9780890425596> Arlington, VA.
- 3 Gray, C. (2010). The new social story book. Revised and expanded 10th anniversary edition. Arlington, TX, USA: Future Horizons.
- 4 Constantin, A. (2015). Supporting practitioners in social story interventions: the ISIS Authoring Tool.
- 5 Propp, V. (2010). Morphology of the Folktale (Vol. 9). University of Texas Press.
- 6 Hammond, S. P. (2011). Children's story authoring with Propp's morphology.
- 7 Hammond, S., Smith, T. J., & Pain, H. (2008, March). Children's Story Authoring with Propp's Morphology: An Exploratory Study. In 5th International Conference on Narrative and Interactive Learning Environments Edinburgh, Scotland 6th–8th August 2008.
- 8 Yu Liu, J. Fu, T. Mei, C. Chen, Let Your Photos Talk: Generating Narrative Paragraph for Photo Stream via Bidirectional Attention Recurrent Neural Networks, AAAI 2017 (<https://www.semanticscholar.org/paper/Let-Your-Photos-Talk%3A-Generating-Narrative-for-via-Liu-Fu/31c8f1f728df2cfea5d0a9dda67a27de82f5a879> (<https://www.semanticscholar.org/paper/Let-Your-Photos-Talk%3A-Generating-Narrative-for-via-Liu-Fu/31c8f1f728df2cfea5d0a9dda67a27de82f5a879>)).
- 9 Jing Wang Jianlong Fu Jinhui Tang Zechao Li Tao Mei, Show, Reward and Tell: Automatic Generation of Narrative Paragraph from Photo Stream by Adversarial Training, AAAI 2018 (<https://www.microsoft.com/en-us/research/publication/show-reward-tell-automatic-generation-narrative-paragraph-photo-stream-adversarial-training/> (<https://www.microsoft.com/en-us/research/publication/show-reward-tell-automatic-generation-narrative-paragraph-photo-stream-adversarial-training/>)).
- 10 Yun-Zhu Song, Zhi Rui Tam, Hung-Jen Chen, Huihao-Han Lu, Hong-Han Shuai, Character-Preserving Coherent Story Visualization, ECCV 2020 (<https://paperswithcode.com/paper/character-preserving-coherent-story> (<https://paperswithcode.com/paper/character-preserving-coherent-story>)).
- 11 Yitong Li, Zhe Gan, Yelong Shen, Jingjing Liu, Yu Cheng, Yuexin Wu, Lawrence Carin, David Carlson, Jianfeng Gao, StoryGAN: A Sequential Conditional GAN for Story Visualization, CVPR 2019, (<https://paperswithcode.com/paper/storygan-a-sequential-conditional-gan-for> (<https://paperswithcode.com/paper/storygan-a-sequential-conditional-gan-for>)).
- 12 Hannah Rashkin, Asli Celikyilmaz, Yejin Choi, Jianfeng Gao, PlotMachines: Outline-Conditioned Generation with Dynamic Plot State Tracking, EMNLP 2020 (<https://paperswithcode.com/paper/plotmachines-outline-conditioned-generation> (<https://paperswithcode.com/paper/plotmachines-outline-conditioned-generation>)).
- 13 Lianhui Qin, Antoine Bosselut, Ari Holtzman, Chandra Bhagavatula, Elizabeth Clark, Yejin Choi, Counterfactual Story Reasoning and Generation, IJCNLP 2019 (<https://paperswithcode.com/paper/counterfactual-story-reasoning-and-generation> (<https://paperswithcode.com/paper/counterfactual-story-reasoning-and-generation>)).
- 14 Alaaeldin El-Nouby, Shikhar Sharma, Hannes Schulz, Devon Hjelm, Layla El Asri, Samira Ebrahimi Kahou, Yoshua Bengio, Graham W.Taylor, Tell, Draw, and Repeat: Generating and Modifying Images Based on Continual Linguistic Instruction, ICCV 2019 (<https://paperswithcode.com/paper/keep-drawing-it-iterative-language-based> (<https://paperswithcode.com/paper/keep-drawing-it-iterative-language-based>)).

### Completion Criteria

1. Design and develop a high-fidelity prototype (e.g. a desktop application or a website) of a system for the AI-Human collaborative production of a story in text, image, or a combination of the two.
2. Evidence-based evaluation of the prototype

### Additional Information

<b>Difficulty</b> 1 - Easy
<b>Capacity</b> Maximum of 4 students.
<b>Popularity</b> 27 students are interested in this project.
<b>Desirable Skills</b> Experience in user studies
<b>Essential Skills</b> Programming (Python), Deep Learning, Machine Learning, having taken "Human-Computer Interaction" course or taking "The Human Factor: Working with Users" course
<b>Ethical Considerations</b> User studies may require Ethical Approval.
<b>Resources Required</b> computer