



## PROFILE

AI Pluralist: Interested in neurosymbolic programming, deep reinforcement learning and generative modelling.

Seek balance between the scientific pursuit of AI and gauging its technological potential for scientific discovery, namely cell science to understand cell pathogenesis during cancer or Alzheimer.

Passionate about the democratization of AI through education.

## CONTACT

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### TWITTER:

@awxuelong

### WEBSITE:

<https://awxlong.github.io/blog>

## AN XUELONG

## EDUCATION

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### American School of Guayaquil

[2013 – 2019]

- “Best Student” award for obtaining highest grade (9.86/10) at the Class of 2019
- International Baccalaureate Diploma: 38/45

### University of Edinburgh

[2019 – 2023]

Undergraduate of Cognitive Science (Master of Arts with Honors – 2:1 Honors)

Notable courses:

- Dissertation about *Charting the Landscape of Neuro-Symbolic Reasoners* with Dr. Antonio Vergari (Grade: 78%)
- Machine Learning Practical with a group project on *Assessing the Robustness of Neuro-Symbolic Modelling in the CLEVR-Hans3 Dataset* (Grade: 76%)
- Machine Learning and Pattern Recognition (Grade: 60%)
- Probabilistic Modelling and Reasoning (Grade: 61%)
- Reinforcement Learning (Grade: 83%)

### University College London

[2023 – 2024]

Master of Science in Artificial Intelligence for Biomedicine and Healthcare

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## PERSONAL PROJECTS

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## GITHUB:

<https://github.com/awxlong>

## HOBBIES

1. Reading academic papers, scientific books and magazines, mainly concerning artificial intelligence (AI), e.g. *The Singularity is Near* by Kurzweil, *Superintelligence* by Nick Bostrom, *AI Future* (*AI 未来*) by Li KaiFu, *Deep Medicine* by Dr. Eric Topol, *Godel Escher Bach* by Douglas Hofstadter, *The Master Algorithm* by Pedro Domingos, among others.

2. Writing about futuristic ideas that deal on how AI can benefit humanity. Other topics are also meant to inspire the audience in getting interested with AI.

3. Teaching about programming, and AI in Spanish

## Literacy Promoter - Robert Allan Reed Center for Adults with Unfinished Education at the American School of Guayaquil

05/2018 – 02/2019

I taught adults ranging from 18 - 50+ years old every Saturday, teaching mainly in the fields of math. I developed organizational skills for delivering education.

## Online Content Producer

04/2020 - present

Driven by my desire to share my ideas, I created a website where I publish articles concerning diverse topics such as the future of medicine resting in harnessing the power of artificial intelligence. Some works include:

- *The Future of Medicine: Big Data and Democratization*, in which I discuss 2 books written by Dr. Eric Topol on AI and medicine <https://awxlong.github.io/blog/2021/topol-orig-tab/> .
- *Deciding when to use narrow AI-based or heuristic-driven solutions for a problem*, where I discuss when it is suitable to use deep learning to solve a problem .
- *Paradigms of AI modelling*, where I list out the major modelling paradigms over the 70 years of AI history <https://awxlong.github.io/blog/2023/penta-paradigm-orig-bib-copy/> .
- *Undergraduate Math Handbook*, where I continuously embed study notes relevant to undergraduate math topics (found in my GitHub)

Link to all writings: <https://awxlong.github.io/blog/>

## AI for Latin American Youth

2022-present

I'm currently working on teaching programming and AI in Spanish for the Latin American audience. Some videos are at <https://www.youtube.com/@classnotesawx> with transcripts and code demos at <https://github.com/awxlong/ai-latam>. Some articles from my website include introducing machine learning from my personal experience <https://awxlong.github.io/blog/2023/ritmo-ia/> and a presentation on neurosymbolic AI: [https://www.instagram.com/stories/ciap\\_espol/3218560237714625995/](https://www.instagram.com/stories/ciap_espol/3218560237714625995/)

## **AI, AGI and Ai**

2021-Present

I'm currently working on a book which discusses the current landscape of artificial intelligence, thoughts on artificial general intelligence and love. Progress at: <https://awxlong.github.io/projects/Ai-agi-ai/>

## **SKILLS**

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**Writing and Illustration** – As shown through my Github webiste, I have experience in writing research articles, blog posts and other creative pieces of writing. I can use LaTeX, markdown, and inkscape for illustrations

**Languages** – I know the following languages in order of level of proficiency, from most to least proficient:

Spanish

English

Chinese

**Programming** – I'm able to use the following programming languages

Python (Pytorch, and other standard data analysis libraries like Pandas, sklearn, matplotlib, seaborn)

R

Java

Haskell

Slurm for working with GPU clusters

HTML

Dart (have completed online courses using Flutter for app development, some of them leveraging AI)

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## **Abstracts of dissertation and machine learning project**

### **Dissertation: Charting the Landscape of Neuro-symbolic Reasoners**

Xuelong An, Antonio Vergari

Pure symbolic or logical approaches to learning are brittle as they are inflexible and do not consider uncertainty. Pure deep learning approaches are equally brittle as they cannot robustly generalize. Neuro-symbolic models try to overcome these two limitations by combining the ability of deep learning approaches as feature engineers/extractors, with the intelligible reasoning capabilities of classical symbolic models.

Interest in this family of models is growing, with a constant influx of novel models and benchmarks to test their robust generalization and reasoning capabilities. However, much of the successes reported by a lot of neuro-symbolic methods over assessed datasets are often too disparate to one another, and it is an ongoing research endeavor to seek a common benchmark suite for which to comprehensively test the plethora of neuro-symbolic models. The prerequisites of devising such benchmark involve understanding how neuro-symbolic methods and datasets relate to one another.

In this thesis, we survey the current panorama of neuro-symbolic model architectures and benchmarks. As a result, we propose a general taxonomy for classifying current and future neuro-symbolic models and reasoning benchmarks. From this, we propose SaSSY-CLEVR, a highly heterogeneous common benchmark suite which can serve as a common testing ground for different neuro-symbolic reasoners to compare their strengths and limitations. We ran experiments on one aspect of our reasoning benchmark, namely CLEVR-Hans3 to showcase how can we conduct comprehensive and fair model comparison between neuro-symbolic and deep learning approaches.

### ***MLP Project: Assessing the Robustness of Neuro-Symbolic Modelling in the CLEVR-Hans3 Dataset***

Xuelong An, Jingxuan Chen and Paolo Cassina

As a branch of Artificial Intelligence, Neuro-Symbolic (NeSy) AI aims to create models capable of robust and parsimonious learning. In our study, we expand on work by Stammer et al. (2021) to test the robustness and parsimony of traditional convolutional neural networks (CNN) and Neuro-Symbolic (NeSy) architectures comprising a Slot Attention and a Set Transformer component. We evaluate their robustness by comparing their classification accuracy after fine-tuning them to a modified version of the CLEVR-Hans3 dataset containing four different kinds of data complications. We find that models using the Slot Attention maintained good classification performance across data complications, indicating that the object-centric representations built by this perceptual component are crucial for model robustness. While a Slot Attention + ResNet18 architecture had the best overall performance, we point out that Slot Attention + Set Transformer is much more parsimonious since it achieves similar results with 20 times fewer parameters.