**Literature review- The Applied Research Centre at the Alan Turing Institute**

**Low-shot learning for structured data**

The Alan Turing Institute is seeking to commission a literature review to inform future research directions in the area of low-shot learning for structured data. The review should be up to **5000 words** in length and should summarise relevant academic literature, identify knowledge gaps and highlight opportunities for future work. It should be written for an interested non-specialist audience and focus on the current state of the art for combining or augmenting low-shot learning with structured knowledge such as ontologies. It is important to understand the amount of data required to train these models and how well they perform on different distributions form their training data.

Training a machine learning model typically requires a large dataset of labelled examples. In the Defence and Security domain, we often encounter problems where a large labelled dataset is not available for training and therefore traditional machine learning models cannot be effectively trained. Low-shot learning approaches seek to address these problems by looking to learn a generalised interclass variation which can be adapted to a specific class given a few examples (typically 1-10). These few-shot approaches often still require large datasets in a similar domain to train an effective few-shot classifier.

In training a machine learning model, it is building its own understanding of the domain. To learn a rich understanding of the domain, a large amount of training data is required. Structured Knowledge such as ontologies can model a domain in a curated manner, to encode the rich human understanding of the domain and reduce the amount of training required of the machine learning models, and therefore the data requirements. Many zero-shot learning techniques combine structured knowledge and machine learning to be able to classify an unseen class, given a description. Such zero-shot models learn attributes to determine a high level description of an object, and the description to determine the class by exploiting the structured knowledge. For a review of such zero-shot learning models see [1].

To apply, please email the completed form (below) to **Alena Frankel (london-arc@turing.ac.uk).**

The deadline for applications is **8th April 2020 (4PM BST)** Selection will be based on technical suitability. Payment will be negotiated based on experience and suitability. Reviews would be expected to commence as soon as practically possible and be complete by 31st December 2020.  Any questions should be addressed to Alena at the above email address.

[1] Fu, Yanwei, et al. "Recent advances in zero-shot recognition: Toward data-efficient understanding of visual content." IEEE Signal Processing Magazine 35.1 (2018): 112-125.

**Form for proposed reviews of literature- Low-shot learning for structured data**

**Name of Review**

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 **Earliest Start date:**

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 **Name of researcher/s:**

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| **Person 1** |
| **Person 2** |
| **Person 3** |

**Please can you briefly describe the suitability and experience of the researcher/s involved**

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 **Days of effort (broken down by person):**

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| **Person 1** |
| **Person 2** |
| **Person 3** |

 **Cost per day per person:**

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| **Person 1** |
| **Person 2** |
| **Person 3** |

 **Total cost:**

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| **Person 1** |
| **Person 2** |
| **Person 3** |

**TOTAL OVERALL COST:**

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Please briefly describe the **scope and focus** that your literature review would take:

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Please briefly describe what the review won’t cover **(out of scope):**

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**END**