Andrew James Morgan

ARC Discovery Early Career Researcher

Data Scientist and Researcher with 9+ years of experience in developing applications for the analysis of large scale (10-100 TB) datasets - derived from complex, stochastic, asynchronous and often faulty sources of information. Proficient in data processing, error checking, probability analysis, machine learning, as well as data visualisation and the presentation of complex problems / insights. Capable of adapting cutting edge research to the needs of a particular problem and finding the right software and analytical tools for the job.

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github.com/andyofmelbourne | andyofmelbourne.github.io

EXPERIENCE

Data Analyst and Researcher in Free-Electron Laser Science

University of Melbourne
05/2018 - Present

Center for Free-Electron Laser Science
11/2013 - 05/2018

- Collaborate and synthesise expertise across multiple teams and specialties to produce analytical frameworks for design and outcome analysis of complex multinational projects.
- Data analysis and validation for numerous projects, in both a leading and support role.
- Bayesian analysis for incomplete and stochastic systems to provide key insights for improving system design and the scientific advancement.
- Application development for real-time analysis enabling feedback in time critical environments, saving time and improving performance on time-limited resources.
- Complex analysis synthesising data from various sources across different networks and data storage formats (raw binary, text, hdf5 etc)
- Gather, adjust and implement innovations in machine learning, stochastic analysis and modelling in the context of new problems.
- Present new insights and problems in an engaging way to multiple audiences with different backgrounds (team-members, collaborators, project leaders, students, general public)

Lecturer - Energy and the Environment

University of Melbourne
03/2020 - Present

- Remodelled the course material and presentation to increase student engagement. Leading to positive feedback from students.
- Managed the transition to online learning by redeveloping the course material and assessment framework.

EDUCATION

PhD in Theoretical Condensed Matter Physcs

University of Melbourne
03/2009 - 08/2013

TECHNICAL SKILLS

Modelling and Prediction
Bayesian optimisation (log-likelihood, expectation maximisation), clustering (k-means, PCA, weighted cross-correlation), high dimensional optimisation with local minima (iterative projection algorithms, non-linear conjugate-gradients)

Programming Languages:
Python, C(++), Fortran, scikit-learn, OpenCL, PHP, SQL, QT (GUI application developement), HTML, JavaScript, ZeroMQ (networking)

Parrallel acceleration:
OpenCL (CPU and GPU connected devices), CUDA (NVIDIA GPU acceleration), MPI - SLURM (network wide/supercomputing calculations)

PROJECTS

OnDA - Online Data Analysis:
Data analysis utility designed for fast online feedback. Capable of providing the essential information required for quick decision making in the face of extreme rates of data collection.

- Addresses a key capability gap in XFEL facilities
- Now used in hundreds of high data-rate experiments
- Utilisises data-reduction, synchronisation, high-speed network comunication and data visualisation.

stash.desy.de/projects/ONDA

Speckle-tracking:
A soffisticated GUI for the validation and analysis of certain large scale x-ray imaging experiments.

- High-speed synthesis of ~1 TB data in a seemless, interactive and real-time UI.
- Many tools for data validation
- Complex analysis accellerated with GPU (OpenCL)

github.com/andyofmelbourne/speckle-tracking

Single Particle Imaging Initiative:
Lead author (manager) in a project to collect, reduce and correct data from numerous experiments into a single database.

- Successfully led a team of experts with different specialisations to systhesise and distil >100 TB of experimental data into ~10 GB.

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