Job Description

ENGINEERING SCIENCE

Job title	Post-doctoral Research Assistant in Machine Learning
Division	Mathematical, Physical and Life Sciences Division
Department	Engineering Science
Location	Central Oxford
Grade and salary	Grade 7 £31,076-£38,183 per annum
Hours	Full time
Contract type	Fixed-term for 24 months
Reporting to	Mihaela van der Schaar, Man Professor in Quantitative Finance
Vacancy reference	130259
Additional information	Reimbursement of relocation costs for postdoctoral positions is only available where allowed on the project.

Research topic	Machine learning for finance
Principal Investigator / supervisor	Mihaela van der Schaar
Project team	Van der Schaar's Research Group, Department of Engineering & Oxford-Man Institute of Quantitative Finance
Project web site	http://www.oxford-man.ox.ac.uk/~mvanderschaar/ & www.oxford-man.ox.ac.uk
Funding partner	
Recent publications	http://www.oxford-man.ox.ac.uk/~mvanderschaar/

The role

The research supported by this post aims to develop next-generation machine-learning methods for finance. It is anticipated that this will involve the development of novel methods in Deep Learning and/or Statistical Methods for the analysis and prediction of financial time-series data.

Responsibilities

Specific duties:

- Manage own academic research and administrative activities. This involves small scale project management, to co-ordinate multiple aspects of work to meet deadlines
- Implement, verify and validate algorithms.
- Write and edit analytical reports detailing the findings.
- Collaborate in the preparation of scientific reports and journal articles and present papers and posters in various venues.
- Represent the research group at external meetings/seminars, either with other members of the group or alone
- Carry out collaborative projects with colleagues in partner institutions, and research groups
- Contribute ideas for new research projects and collaborate in the development and preparation of research grants.
- Act as a source of information and advice to other members of the group.
- The researcher may have the opportunity to undertake ad-hoc paid teaching (this includes lecturing, demonstrating, small-group teaching, tutoring of undergraduates and graduate students and supervision of masters projects in collaboration with principal investigators). Permission must be sought in advance for each opportunity and the total must not exceed 4 hours a week.

Additional duties

- Small-scale project management and co-ordination.
- Collaborate in the development and preparation of research grants.
- Carry out collaborative projects with colleagues in partner institutions, and research groups.
- Provide information and advice to other members of the team.

Selection criteria

Essential

- Hold a relevant PhD/DPhil (or be near completion), together with relevant experience;
- Experience in machine learning or applied statistics etc.;
- Track record of relevant published work concomitant with experience;
- Ability to work well independently and as part of a team, as well as to possess interpersonal skills necessary to contribute effectively to a collaborative and interdisciplinary project;
- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings.

Desirable

- Previous experience in Deep Learning
- Previous experience with the practical implementation of machine learning in finance.

The University

The University of Oxford is a complex and stimulating organisation, which enjoys an international reputation as a world-class centre of excellence in research and teaching. It employs over 10,000 staff and has a student population of over 22,000.

Most staff are directly appointed and managed by one of the University's 130 departments or other units within a highly devolved operational structure - this includes over 6,500 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and over 2,700 'support' staff (including clerical, library, technical, and manual staff). There are also over 1,600 academic staff (professors, readers, lecturers), whose appointments are in the main overseen by a combination of broader divisional and local faculty board/departmental structures. Academics are generally all also employed by one of the 38 constituent colleges of the University as well as by the central University itself.

Our annual income in 2012/13 was £1,086.9m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts exceeds £436.8m p.a., and more than 80 spin-off companies have been created.

For more information please visit www.ox.ac.uk/staff/about_the_university.html

Engineering Science Department

Engineering teaching and research takes place at Oxford in a unified Department of Engineering Science whose academic staff are committed to a common engineering foundation as well as to advanced work in their own specialities, which include most branches of the subject. The Department is ranked third in the world in the latest *Times Higher Education World University Rankings*, behind Caltech and Stanford, but ahead of MIT (4th), Cambridge (5th), Princeton (6th) and Imperial (7th).

We have especially strong links with computing, materials science and medicine. The Department employs about 100 academic staff (this number includes 13 statutory Professors appointed in the main branches of the discipline, and 25 other professors in the Department); in addition there are 9 Visiting Professors. There is an experienced team of teaching support staff, clerical staff and technicians. The Department has well-equipped laboratories and workshops, which together with offices, lecture theatres, library and other facilities have a net floor area of about 22,000 square metres.

Teaching

We aim to admit 170-180 undergraduates per year, all of whom take a 4-year Engineering Science course leading to the MEng degree. The course is accredited at MEng level by the major engineering institutions. The syllabus has a common core extending through the first two years. Specialist options are introduced in the third year, and the fourth year includes further specialist material and a major project.

Research

The Department was ranked the top engineering department in the UK, as measured by overall GPA, in the Research Excellence Framework 2014 exercise. We have approximately 350 research students and about 130 Research Fellows and Postdoctoral researchers. Direct funding of research grants and contracts, from a variety of sources, amounts to an annual turnover of approximately £27m in addition to general turnover of about £28m. The research activities of the department fall into seven broad headings, though there is much overlapping in practice:

Thermofluids; Materials and Mechanics; Civil and Offshore; Information, Control and Vision; Electrical and Optoelectronic; Chemical and Process; Biomedical Engineering.

For more information please visit: http://www.eng.ox.ac.uk/

Information Engineering

This grouping maintains dedicated teams in four fields: computer vision and image understanding; mobile robotics and automation; machine learning; and control engineering and systems. We address a wide array of information engineering questions, exploring both fundamental research and high impact applications. For example, our work on image understanding will make the entire BBC photo archive searchable, with the ultimate aim of categorising every image on the internet. Robotics research is delivering high impact in autonomous transport (for example, driverless vehicles controlled by our software were tested on public roads in October 2016), while work on machine learning and big data is tackling problems as diverse as water management and exo-planet detection.

Our active-vision experts have, through their pioneering PTAM virtual reality system, moved real-time computer vision from desktop into the pocket. Our dynamics and optimal control work has resulted in research with, and support from Ferrari Formula One on minimum lap-time simulation, driver simulator design and the control of the 2014 power train. Research on complex network systems, meanwhile, is advancing our understanding and control of cell signalling pathways paving the way towards personalised medicine and better drugs.

The Machine Learning Research group unites pioneering work on foundational machine learning topics with the application of that work to applications motivated by great societal and scientific challenges. In particular, our work on machine intelligence promises technologies that will free the potential of human intelligence. The group develops systems that can provide decision making upon data at a scale beyond the human, while realising the benefits of subtle human judgement and creativity. Our work has found impact in vast data arenas, such as *Zooniverse* (where it is used to optimally combine millions of decisions). The group has also led the development of Probabilistic Numerics, an approach to machine learning that introduces intelligence to every level of an algorithmic pipeline. Specifically, this approach augments existing high-level machine learning models with intelligent numerical techniques, ensuring modularity and the correct propagation of decisions through the system. This work has found application in domains ranging from astronomy and finance to biomedical engineering and zoology. In the former, the group's work has been incorporated into NASA's *Kepler space telescope* pipeline for the detection of planets in distant solar systems as well as forming the core of the vast data analyses in such projects as the *Square Kilometre Array*; in the latter, it has led to winning high-profile funding such as the *Google Impact Challenge* to detect disease-bearing mosquitoes. The group has also addressed the broader societal consequences of machine learning and robotics, working to analyse how intelligent algorithms might soon substitute for human workers, and predicting the resulting impact on employment. The group has a strong focus on machine learning applied to commercial and industrial problem domains, including finance. For more information see www.robots.ox.ac.uk/~parg

The Oxford-Man Institute of Quantitative Finance

The Oxford-Man Institute (OMI) of Quantitative Finance is an interdisciplinary research centre in quantitative finance. It is a part of the Department of Engineering Science. It has a particular focus on alternative investments and data-driven science. It aims to carry out academically outstanding research that addresses the key problems facing the financial industry. Its researchers create new tools and methods that can give deeper insight into financial markets – how they behave, how they become stable or unstable, how to extract value from data at scales beyond human and how they could be made to work better. This is achieved through a unique

combination of academic innovation and external engagement. The OMI has its own building in the heart of Oxford, which houses its faculty, post-docs and students, as well as support staff. It provides excellent research facilities including outstanding computing and data resources and a well-supported seminar and conference program. The University of Oxford and Man Group have worked in partnership since 2007 when Man Group provided the cornerstone funding for the OMI, co-located with the firm's own commercial research laboratory and research staff, establishing the OMI as a world-leading interdisciplinary academic institute for research into quantitative finance. The OMI will continue to conduct its outstanding research programme, now with the benefit of additional machine learning focus and expertise, both in techniques that are directly applicable to finance and those transferrable from other fields of study. This focus will create a hub for machine learning and data analysis at Eagle House, the current home of the OMI and Man AHL's Oxford research lab. The aim is to foster a stimulating environment composed of researchers focused on machine learning techniques, whereby machine learning and data analytics expertise can be shared and leveraged. For more information see www.oxford-man.ox.ac.uk.

The University of Oxford is a member of the Athena SWAN Charter and holds an institutional Bronze Athena SWAN award. The Department of Engineering Science holds a Departmental Bronze Athena award in recognition of its efforts to introduce organisational and cultural practices that promote gender equality in SET and create a better working environment for both men and women.

The Mathematical, Physical, and Life Sciences Division

The Mathematical, Physical, and Life Sciences (MPLS) Division is one of the four academic divisions of the University. Oxford is widely recognised as one of the world's leading science universities. In the results of the six-yearly UK-wide assessment of university research, REF2014, the MPLS division received the highest overall grade point average (GPA) and the highest GPA for outputs. We received the highest proportion of 4* outputs, and the highest proportion of 4* activity overall. More than 50 per cent of MPLS activity was assessed as world leading.

The MPLS Division's 10 departments and 3 interdisciplinary units span the full spectrum of the mathematical, computational, physical, engineering and life sciences, and undertake both fundamental research and cutting-edge applied work. Our research addresses major societal and technological challenges and is increasingly focused on key interdisciplinary issues. MPLS is proud to be the home of some of the most creative and innovative scientific thinkers and leaders working in academe. Our senior researchers have been awarded some of the most significant scientific honours (including Nobel prizes and prestigious titles such as FRS and FREng) and we have a strong tradition of attracting and nurturing the very best early career researchers who regularly secure prestigious fellowships

We have around 6,000 students and play a major role in training the next generation of leading scientists. Oxford's international reputation for excellence in teaching is reflected in its position at the top of the major league tables and subject assessments.

MPLS is dedicated to bringing the wonder and potential of science to the attention of audiences far beyond the world of academia. We have a strong commitment to supporting public engagement in science through initiatives including the Oxford Sparks portal (http://www.oxfordsparks.net/) and a large variety of outreach activities; these are crucial

activities given so many societal and technological issues demand an understanding of the science that underpins them. We also endeavour to bring the potential of our scientific efforts forward for practical and beneficial application to the real world and our desire is to link our best scientific minds with industry and public policy makers.

For more information about the MPLS division, please visit: http://www.mpls.ox.ac.uk/

Working at the University of Oxford

For further information about working at Oxford, please see:

www.ox.ac.uk/about_the_university/jobs/research/

How to apply

Before submitting an application, you may find it helpful to read the 'Tips on applying for a job at the University of Oxford' document, at www.ox.ac.uk/about/jobs/supportandtechnical/.

If you would like to apply, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. Please provide details of two referees and indicate whether we can contact them now.

You must upload a CV and a supporting statement. The supporting statement should explain how you meet the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants).
Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

Please upload all documents **as PDF files** with your name and the document type in the filename.

All applications must be received by **midday** on the closing date stated in the online advertisement.

Information for priority candidates

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing departments.

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments)

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from www.ox.ac.uk/about_the_university/jobs/support/. To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.

Please note that you will be notified of the progress of your application by automatic emails from our e-recruitment system. **Please check your spam/junk mail** regularly to ensure that you receive all emails.

Important information for candidates

Pre-employment screening

Please note that the appointment of the successful candidate will be subject to standard pre-employment screening, as applicable to the post. This will include right-to-work, proof of identity and references. We advise all applicants to read the candidate notes on the University's pre-employment screening procedures, found at:

www.ox.ac.uk/about/jobs/preemploymentscreening/.

The University's policy on retirement

The University operates an employer justified retirement age for all academic and academic-related posts (grade 6 and above), for which the retirement date is the 30 September immediately preceding the 68th birthday. The justification for this is explained at: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revaim/.

For **existing** employees any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/revisedejra/revproc/

There is no normal or fixed age at which **support staff** in posts at **grades 1–5** have to retire. Support staff may retire once they reach the minimum pension age stipulated in the Rules of the pension scheme to which they belong.

Equality of Opportunity

Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

Benefits of working at the University

Training and Development

A range of training and development opportunities are available at the University. Further details can be found at www.ox.ac.uk/staff/working_at_oxford/training_development/index.html.

For research staff only: Support for Research Staff

There is a particularly wide range of support for career development for research staff. Please visit: www.ox.ac.uk/research/support-researchers to find out more.

Pensions

The University offers generous occupational pension schemes for eligible staff members. Further details can be found at www.admin.ox.ac.uk/finance/epp/pensions/pensionspolicy/.

Information for international staff *(or those relocating from another part of the UK)*

A wealth of information is available on the University's International Staff website for staff who are relocating to Oxford from abroad, at www.admin.ox.ac.uk/personnel/staffinfo/international/.

The University of Oxford Newcomers' Club

The Newcomers' Club is aimed at helping partners of newly-arrived visiting scholars, graduate students and academic members of the University to settle in and to meet people in Oxford.

Transport schemes

The University offers a range of travel schemes and public transport travel discounts to staff. Full details are available at www.admin.ox.ac.uk/estates/ourservices/travel/.

University Club and University Sports Facilities

The University Club provides social, sporting and hospitality facilities. It incorporates a Club bar, a cafe and sporting facilities, including a gym. See www.club.ox.ac.uk for all further details.

University staff can use the University Sports Centre at discounted rates, and have the chance to join sports clubs. Please visit www.sport.ox.ac.uk/oxford-university-sports-facilities.

Childcare and Childcare Vouchers

The University offers quality childcare provision services at affordable prices to its employees. For full details about the services offered, please visit www.admin.ox.ac.uk/childcare/. **NB: Due to the high demand for the University's nursery places there is a long waiting list.**

The University also offers nursery fee payment schemes to eligible staff as an opportunity to save tax and national insurance on childcare costs. Please visit www.admin.ox.ac.uk/childcare.

Disabled staff

The University is committed to supporting members of staff with a disability or long-term health condition and has a dedicated Staff Disability Advisor. Please visit www.admin.ox.ac.uk/eop/disab/staff for further details.

BUPA - Eduhealth

Bupa Eduhealth Essentials private medical insurance offers special rates for University of Oxford staff and their families www.eduhealth.co.uk/mini-site/.

All other benefits

For other benefits, such as free entry to colleges, the Botanic Gardens and staff discounts offered by third party companies, please see www.admin.ox.ac.uk/personnel/staffinfo/benefits/.