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Name: Peter A. Chew, D.Phil. [PhD], CPA, CFE.

Areas of Expertise:

- Data analytics / finance and national security
 - Financial technology (FinTech)
 - Text analytics
 - Business process streamlining
 - Computational linguistics
 - Computational finance
 - Financial engineering
 - Information systems
 - Database management systems
 - Visualization of large data
 - Data search and retrieval
 - Accounting and finance
 - Foreign languages
- 1) Devising and applying algorithms to solve data-intensive problems from diverse domains using advanced mathematics including linear algebra and probability theory;
 - 2) Conducting original empirical research in the field of data mining and communicating the results of the research to diverse communities including end-users in business, government and academia using a variety of communications channels including seminars, white papers, peer-reviewed articles, and others; and
 - 3) Re-engineering business (particularly financial) processes for small to large organizations to make more effective and efficient use of data, often providing significant return on investment (ROI) to customers.

Experience includes management responsibilities and research and analysis roles in public and private sector organizations.

Education:

D.Phil. [Ph.D.], Computational Linguistics, University of Oxford, U.K., 2000
M.St., Slavic Studies, University of Oxford, U.K., 1994
B.A., Russian Language and Literature, University of London, U.K., 1993

Current and Previous Employment (Professional):

Principal Investigator, Galisteo Consulting Group, Inc., Albuquerque, NM (2011-present)

Developed two custom patent-pending algorithms using text analysis and information theory to solve data-matching problems in account reconciliation. Personally implemented these algorithms in a Microsoft SQL Server / ASP.NET application for a customer, saving the customer several hundred thousand dollars in manual labor costs. Provide analytic expertise to support fraud investigations.

Senior Manager, Moss Adams LLP, Albuquerque, NM (2009-2011)

Led teams on multiple contracts for a Federal agency (including one multi-year, multi-million dollar contract). Re-engineered the information technology system used for account research, saving thousands of projected man-hours by developing and implementing an algo-

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rithm to automate account rounding based on an approach better known in statistics for construction of contingency tables from fixed marginals (see entry under 'Publications' below).

Technical Staff Member, Sandia National Laboratories, Albuquerque, NM (2004-2009)

Provided leadership as Laboratory-Directed Research and Development (LDRD) Principal Investigator (PI) in research projects with national security applications; worked with other PIs on internally-funded projects and projects for external customers. Projects have broadly involved novel methods for unsupervised text analysis, especially multilingual text analysis applied to blogs (see 'Selected Relevant Publications' and patent application under 'Relevant Awards' below).

- Involved in all phases of projects including:
 - Successful grant-proposal writing
 - Execution of research including teamwork with colleagues
 - Designing software systems to prototype and test research ideas
 - Publishing results in peer-reviewed conferences and journals
 - Working to identify opportunities for technology transfer
- Led collaboration between individuals from multiple disciplines at Sandia and outside
- Interacted with and presented to a broad variety of colleagues including Russian visitors to Sandia
- Worked with enterprise database management systems to support data-intensive R&D projects
- Received funding from Sandia's New Mexico Small Business Assistance Program to transfer text analysis technology to New Mexico small businesses

Senior Consultant, Neff + Ricci LLP (consulting firm), Albuquerque, NM (2001-2004)

Analyze and reengineer existing systems to serve a variety of government and private-sector clients in New Mexico, using Microsoft SQL Server, Visual Basic, and Microsoft Access. Participate in financial and information technology audits of similar range of clients.

Self-employed consultant, Oxford, United Kingdom (2000)

Apply data analytics technology to cut time required to complete routine accounting tasks.

Senior Auditor, Price Waterhouse, Windsor, United Kingdom and Moscow, Russia (1994-1996)

Participate in audits of a variety of large and/or multinational companies in diverse sectors including finance, commodities, technology, and engineering.

Professional and Community Organizations:

Association of Computational Linguistics
Certified Public Accountant (New Mexico)
American Institute of Certified Public Accountants
Institute of Electrical and Electronics Engineers
Association of Certified Fraud Examiners

Patents issued:

- US Patent Office # 9,037,607: Unsupervised Analytical Review, filed Mar. 14, 2013, issued May 19 2015. Sole inventor.



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- US Patent Office # 8,706,758: Flexible Account Reconciliation, filed Feb. 20, 2012, issued Apr. 22 2014. Sole inventor.
- US Patent Office # 8,639,596: Automatic Account Reconciliation Method, filed Oct. 4 2011, issued Jan. 28 2014. Sole inventor.
- US Patent Office # 8,290,961: Technique for Information Retrieval Using Enhanced Latent Semantic Analysis, filed Jan. 13 2009, issued Oct. 16 2012. First named inventor.

Honors and Awards:

- First time pass in Certified Fraud Examiner examination, 2010
- First time pass in all parts of the Uniform Certified Public Accountant exam, 2002
- A highly competitive British Academy studentship for doctoral study in computational linguistics at the University of Oxford, 1996-1999
- Scholarship from Jesus College, Oxford, 1996-1999
- Distinction in final examinations at University of Oxford, 1994
- First Class Honors with Distinction in various individual subjects, Univ. of London, 1993
- Michael John Youhotsky prize for the undergraduate achieving the best overall performance in 2nd-year Russian language and literature exams, Univ. of London, 1990
- King's Scholarship to Eton College, 1983

Language Skills:

Russian: excellent speaking, oral comprehension, reading and writing
French: excellent reading, moderate speaking, oral comprehension, and writing
Polish: moderate speaking, reading, writing and oral comprehension
Arabic: beginner skills
Classical Latin: good reading skills
Classical and New Testament Greek: good reading skills

Computer programming skills:

Microsoft SQL Server – including high proficiency in Transact-SQL for analytical query design
Software development in Visual Basic, C#, ASP.NET, C++, Matlab, Prolog.
Highly proficient in Microsoft Office applications including Access and Excel

Publications [selected]:

1. **Chew, Peter A.** and Turnley, Jessica G. 2016. Rethinking sentiment analysis and 'master narratives': an alternative unsupervised text analytics approach using 'information space differences'. Computational Social Science Society of the Americas.
2. Dunlavy, Daniel M. and **Chew, Peter A.** 2016. Constrained Versions of DEDICOM for Use in Unsupervised Part-Of-Speech Tagging. SANDIA REPORT SAND2016-4520.
3. **Chew, Peter A.** 2016 (under review). Multilingual Retrieval and Topic Modeling using Vector-Space Word Alignment.
4. **Chew, Peter A.** 2016 (under review). Natural Language Processing Meets Accounting, Increases Accuracy, and Reduces Costs.



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5. **Chew, Peter A.** 2015. "Linguistics-Lite" Topic Extraction from Multilingual Social Media Data. *Social Computing, Behavioral-Cultural Modeling, and Prediction. Lecture Notes in Computer Science* Volume 9021, 2015, pp 276-282.
6. **Chew, Peter A.** 2013. Critiquing Text Analysis in Social Modeling: Best Practices, Limitations, and New Frontiers. *Social Computing, Behavioral-Cultural Modeling and Prediction Lecture Notes in Computer Science* Volume 7812, 2013, pp 350-358.
7. **Chew, Peter A.** and David G. Robinson. 2012. Automated account reconciliation using probabilistic and statistical techniques. *International Journal of Accounting and Information Management* 20(4), pp. 322-334.
8. **Chew, Peter A.**, and Andrew Wilson. To appear. Using computational techniques to solve the inexact-rounding problem.
9. Jessica Turnley, **Peter A. Chew** and Aaron Perls. 2012. Beyond validation: alternative uses and associated assessments of goodness for computational social models. In *Proceedings of Social Computing, Behavioral-Cultural Modeling and Prediction*, pp. 147-155.
10. **Philip Kegelmeyer, Brett Bader and Peter A. Chew.** 2011. Multilingual sentiment analysis using Latent Semantic Indexing and Machine Learning. *ICDMW '11 Proceedings of the 2011 IEEE 11th International Conference on Data Mining Workshops*, pp. 45-52
11. **Chew, Peter A.**, Brett Bader, Steve Helmreich, Ahmed Abdelali, and Stephen Verzi, 2011. An information-theoretic, vector-space-model approach to cross-language information retrieval. *Journal of Natural Language Engineering* 17, pp. 37-70.
12. Andrew Wilson and **Peter A. Chew**, 2010. Term weighting schemes for Latent Dirichlet Allocation. In *Proceedings of NAACL-HLT 2010*, 465-473.
13. **Peter A. Chew** and Brett Bader, 2009. Using DEDICOM for completely unsupervised part-of-speech tagging. In *Proceedings of the NAACL-HLT 2009 workshop on Unsupervised and Minimally Supervised Learning of Lexical Semantics*, 54-62.
14. **Peter A. Chew**, Brett Bader, and Ahmed Abdelali. 2008. Latent morpho-semantic analysis: multilingual information retrieval with character n-grams and mutual information. In *Proceedings of 22nd International Conference on Computational Linguistics (COLING 2008)*, 129-136.
15. Brett Bader and **Peter A. Chew**, 2008. Enhancing multilingual Latent Semantic Analysis with term alignment information. In *Proceedings of 22nd International Conference on Computational Linguistics (COLING 2008)*, 49-56.
16. **Peter A. Chew** and Ahmed Abdelali. 2008. The effects of language relatedness on multilingual information retrieval: a case study with Indo-European and Semitic languages. *Proceedings of the 2nd International Workshop on Cross Lingual Information Access*, 1-9.
17. **Peter A. Chew**, Philip Kegelmeyer, Brett Bader and Ahmed Abdelali. 2008. The knowledge of good and evil: multilingual ideology classification with PARAFAC2 and machine learning. In *Language Forum* 34(1), 37-52.
18. J. Dan Morrow, Brett Bader, **Peter A. Chew** and Ann Speed. 2008. Ideological determination using small amounts of text. *The annual meeting of the ISA's 49th Annual Convention, Bridging Multiple Divides*, San Francisco, CA, 2008.
19. Brett W. Bader, Travis L. Bauer, Chris Beers, **Peter A. Chew**, J. Dan Morrow, Nicholas Pattengale, Ann Speed, Brian Titus & Christina Warrender. Determining ideology shifts



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- from adversary text. *Technical Report SAND2008-6186, Sandia National Laboratories, Albuquerque, NM and Livermore, CA, September, 2008.*
20. **Peter A. Chew**, Brett Bader, Tamara Kolda, and Ahmed Abdelali. 2007. Cross-language information retrieval using PARAFAC2. In *Proceedings of ACM SIGKDD*, 143-152.
 21. **Peter A. Chew** and Ahmed Abdelali, 2007. Benefits of the 'Massively Parallel Rosetta Stone': Cross-Language Information Retrieval with over 30 Languages. In *Proceedings of the 45th Annual Meeting of the Association for Computational Linguistics, ACL 2007*, pp. 872-879.
 22. **Peter A. Chew**, Stephen Verzi, Travis Bauer and JT McClain. 2006. Evaluation of the Bible as a resource for cross-language information retrieval. In *Proceedings of the Workshop on Multilingual Language Resources and Interoperability*, 68-74.

Selected recent or forthcoming presentations:

1. **Peter A. Chew**. 2016. Machine translation meets vector-space information retrieval for faster, better multilingual topic modeling. Sandia National Laboratories Computer Science Research Institute.
2. **Peter A. Chew**. 2012. Faster, Better and Cheaper Ways to Find Patterns and Anomalies in Data. Association of Certified Fraud Examiners, Albuquerque chapter.
3. **Peter A. Chew**. 2012. Solving Big Data Problems: From Heuristics to Theory. Los Alamos National Laboratory.
4. **Peter A. Chew**. 2012. Faster, Better, Cheaper: Solving Account Reconciliation Problems Using Data Mining Algorithms. Association of Government Accountants, Santa Fe, NM.
5. **Peter A. Chew**. 2012. Wall Street Meets Main Street: Account Reconciliation Using Data Mining Algorithms. Information Systems and Control Association, Albuquerque, NM.
6. **Peter A. Chew**. 2012. Data Reconciliation: An Information-Theoretic and Algebraic Approach. Poster at the Conference on Data Analysis, Santa Fe, NM.
7. **Peter A. Chew**. 2011. Introduction to Data Mining for Auditors. University of New Mexico Anderson School of Management.
8. **Peter A. Chew**. 2010. Practical Uses of Statistics to Solve Common Accounting Problems. Office of the Special Trustee for American Indians, Albuquerque, NM.
9. **Peter A. Chew**. 2010. Roles for Information Theory in Natural Language Processing. Sandia National Laboratories Computer Science Research Institute, Albuquerque, NM.
10. **Peter A. Chew** and James Thompson. 2010. Advanced Information Technology Techniques for Large-Scale Document Management. American Association of Attorney-Certified Public Accountants, Albuquerque, NM.

Books & Chapters:

- Brett Bader and **Chew, Peter A.** Algebraic techniques for multilingual document clustering. In Berry and Kogan (eds.), 2010. *Text Mining: Applications and Theory*. Chichester, UK: Wiley.
- Chew, Peter A.** Multilingual text mining. In Wang (ed.), 2009. *Encyclopedia of Data Warehousing and Mining*, 2nd edition, 1380-1385.