A Professional Big Data Master’s Program to train Computational Specialists

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School of Computing Science
• Definitions of Training, Education and Employability.
• What skills, knowledge and capabilities are needed for good employability?
• Have they been formally defined?
• Who defines them?
• How do we define the relevant BDA curricula?
• How do / should we deliver the courses?
• What can we learn from our experience?
Our goal is to train computational specialists who can construct models, develop algorithms and write software that can extract actionable knowledge from Big Data.

- **Graduate Program**
  - targeted at students who have completed their undergraduate studies in an information technology or scientific field, including professionals
- **Small cohort taking 16 months including co-op**
  - Traditional graduate course delivery (5 courses) plus specialized lab work (4 courses)
Areas covered: the five pillars

- **Systems**
  - for storing, computing and managing large-scale data
- **Algorithms**
  - well-versed in highly efficient algorithms for processing massive data
- **Machine learning**
- **Data mining**
  - extract patterns from large-scale data and machine learning
- **Visualization**
  - present the information obtained from the data to users who can act on this information
Areas covered

- Analysis of scalability of algorithms to big data.
- Data warehouses and online analytical processing.
- Efficient storage of big data including data streams.
- Scalable querying and reporting on massive data sets.
- Scalable and distributed hardware and software architectures.
- Software as a service. Cloud Computing (e.g. Amazon EC2, Google Compute Engine)
- Big data programming models: map-reduce, distributed databases, software for implementing streaming and sketching algorithms.
• Dealing with unstructured data such as images, text or biological sequences.
• Scalable machine learning methods such as online learning.
• Data mining: methods for learning descriptive and predictive models from data.
• Distributed algorithms over very large graphs and matrices.
• Social media analysis.
• Visualization methods and interactive data exploration.
Hardware and Software Environment

- Premium workstations and displays
  - wide range of commercial visual analytics software
  - in the Vancouver Institute for Visual Analytics (VIVA) lab.
- Amazon compute cloud EC2 / Google Compute Engine.
- Local Hadoop cluster for programming assignments.
- Other cloud computing experimental testbeds already in use at SFU for research.
Tuition

- Domestic students program cost is CAD $26,000 / USD $23,400 over 16 months.
- International students program cost is CAD $31,280 / USD $28,150 over 16 months.
Education for Employable Graduates: Critical Questions

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Graduate training on core technical technology and hands-on application to real world problems.
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Five pillars foundational work plus lab work and co-op. Will evaluate curriculum after each cohort.
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Conducted research and market study. More work needs to be done here.
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Traditional classroom plus tutorial based labs.
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In progress. Very popular, and attracting high quality applicants.
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