Opportunities for Internships & Employment at HSB & Munich Re for Graduate Students

11/16/2022
Nathan Lally: AVP Data Science
HSB: A Munich Re Company
First a Little About Me

Education:
- BA Political Science
- BA Mathematics/Statistics
- MS Mathematics

Career:
- General Dynamics
- The Hartford Insurance
- Pratt & Whitney (Raytheon)
- HSB - Munich Re

Volunteering:
- VP for Education @ NESS
About HSB & Munich Re
Our Company – HSB & Munich Re

HSB and Munich Re Group

HSB- Hartford Steam Boiler:
- Founded on June 30, 1866, as one of the first companies dedicated to industrial safety.
- HSB offers insurance for equipment breakdown, cyber risk, data breach, identity recovery & employment practices liability.
- HSB’s Applied Technology Solutions division leverages IoT to deliver unique risk management solutions

Munich Re Group:
- World’s largest reinsurance firm. Operates globally.

Well, that isn’t the office building…
Our Company – Munich Re
Strong business fields under one roof

Munich Re Group exists of well-known brands standing for extraordinary expertise in reinsurance, primary insurance and asset management.

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Munich Re Group is one of the world's leading risk carriers with more than 140 years of unrivalled risk-related expertise.

... plays a key role in addressing and insuring climate risks to make the world more resilient.

... covers the entire value chain of reinsurance, primary insurance, insurance related services and capital market solutions.

... provides coverage for extraordinary risks such as rocket launches, renewable energies or cyberattacks.

... maintains with 47,000 employees a global presence in 50+ countries.

... drives the digital transformation of the insurance industry in order to push forward the boundaries of insurability.
Our Team @ HSB

HSB Data & Analytics Organization – Data Science Teams

- Data Science – Insurance
  - DS AVP – Insurance Yue Tang
  - Chuan Wang Principal DS
  - Sakthivel Sabapathy DS
  - Chuchu Wei DS
  - Gregory Guranich DS
  - Cyber Vulnerabilities Scanning
  - TCDB Treaty Quality Check
  - MDIS Data Exploration & Modeling
  - Transactional Cyber

- Data Science – Engineering & Technology
  - DS AVP – Eng & Tech Nathan Lally
  - Esha Wang Senior DS
  - Peng Xiao Senior DS
  - Yue Du DS
  - Ziyun Wu
  - ATS Data Science Lead & Peer Review Lead
  - Engineering Data Science Lead & Team DS Technology Expert
  - Engineering Data Science Assistant & LRS Lead Developer
  - ATS Data Science Assistant & TBD

+ interns & university co-ops
Data Science Organization Details

- Team Composition:
  - 2 Managers
  - 8 Full Time Data Scientists
  - 4 Summer Interns (could be you!)
  - 2 PhD Candidate Co-ops

- Full-time Team Educational Background
  - PhD: CS (1), Econ (1), Statistics (3)
  - MS: Statistics (2), Math (1), Data Science (1), Engineering (1)

- Main Skillsets
  - Bayesian inference, statistical learning, deep learning, distributed computing, algorithms, software engineering, control systems and optimization

Technology Stack

- Microsoft Azure
- Databricks
- R
- PyTorch
- Python
Munich Re has trained a significant proportion of the staff working on data analytics topics to ensure maximum business proximity.
What do Statisticians and Data Scientists do at HSB & Munich Re?
What do Statisticians and Data Scientists do at HSB & Munich Re?

Major Business Areas Supported (Typical Company):
• **Underwriting**: evaluate and analyze the risks involved in insuring people and assets.
• **Actuarial**: analyze the financial costs of risks.
• **Catastrophe Modeling**: model large, simultaneous and often connected loss events (ex. natural catastrophe).
• **Claims**: determine how much the company should pay for a loss.
• **Finance & Risk Management**: optimally manage capital and ensure sufficient holdings to cover rare, adverse events.
• **Digital Marketing**: online marketing optimization.

Unique to HSB – Munich Re:
• **Engineering Services**: perform inspections, research insurable assets, loss control, inform other business units.
• **Internet of Things (IoT)**: objects embedded with sensors communicating with each other over networks.

A Consulting Model:
- Statisticians and data scientists generally do not develop or manage insurance products.
- We serve as consultants to business leads; enabling objective decision making based on sound empiricism.

A Shift in Responsibility?:
- In today’s business environment, insurance data scientists are now being asked to develop, monetizable data assets and IP.
What do Statisticians and Data Scientists do at HSB & Munich Re? An Underwriting Example

Clients need to improve their property UW, Loss Control and other Risk Management activities.

HSB and Munich Re have valuable proprietary data that can be utilized to provide insight and enhanced risk segmentation for our client companies.

This data is enriched with an ever growing set of third-party data sources to create risk models that are built using cutting edge distributed machine learning algorithms with state-of-the-art big data technologies.

Data Preparation

Modeling

Evaluation

Business Understanding

Data Understanding

Data Preparation

Modeling

Overall Risk Distribution

Risk Distribution by State

Risk Distribution by Top Predictors

Access for Clients are provided via Production Level Data Services

Location/Claim Data

Property Data

Engineered Data

Census Level Data

Geography & Weather Data

Location Risk Score Model

✓ Provides location specific scores based on the likelihood that the location will have an equipment breakdown loss

✓ Can be used in focused inspections, a factor used to enhance property loss cost models and sensor placement prioritization

Explainable AI/ Reason Code
Problem:
– For HSB’s freeze loss monitoring program to add value to our clients, we need to prove we can motivate behavioral change among end insureds.
– However, customers sometimes fail to acknowledge alerts (respond to calls or texts) at all.

Solution:
– Using sensor data and causal AI/ML methods, infer whether a customer took action from the data alone.

Usage:
– Portfolio performance monitoring
– Outreach/intervention optimization
– Potential for derivative data products
Opportunities for Graduate Students
What Skills do You Need to Succeed at HSB?

Core Competencies

**Statistics & Machine Learning**
- Mathematical Statistics
- GLM & GAM
- Time Series Analysis
- Statistical Learning
- Deep Learning
- Causal Inference

**Business Knowledge**
- Product Design
- Principles of Underwriting
- Pricing
- Regulation
- Financial Management

Growing Demand

**Data Engineering**
- Relational DBs
- SQL
- Unstructured Data
- Big Data Technology (ex. Spark, Hive)
- Domain Knowledge

**DevOps/MLOps**
- Model monitoring, management and deployment
- Code Versioning
- CI/CD Pipelines/Automation
- Containerization

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Career Paths at HSB and Munich Re

Associate Data Scientist
- Entry Level
- Undergraduate in Quantitative Field

Data Scientist
- Entry Level – 2+ Years of Experience
- MS or PhD in Quantitative Field

Senior Data Scientist
- 4+ Years of Experience
- MS in Quantitative Field or PhD

Principal Data Scientist
- 6+ Years of Experience
- MS in Quantitative Field or PhD

Data Science Lead
- 8+ Years of Experience
- MS in Quantitative Field or PhD

Preferred Degree Programs:
- Statistics
- Computer Science
- Mathematics & Applied Mathematics
- Data Science (Non-Business Programs)

Expectations:
- Associate – Data Scientist
  - Work on focused, well defined technical problems
- Senior – Principal Data Scientist
  - Guide technical direction of larger projects, mentor junior staff, collaborate closely with business partners
- Lead Data Scientist
  - Individual contributor managing a technical discipline
Hiring 3 Graduate Interns and 1 Undergraduate

[Link to careers page]

- **Graduate Student Link**
  - [Link to job posting]

- **Undergraduate Student Link**
  - [Link to job posting]

Qualifications for Graduate Students

- MS or PhD Student in Data Science, Statistics, Computer Science, Mathematics, Physics, Electrical Engineering or a related applied science with a heavy quantitative emphasis. The ideal candidate is adept at using large data sets to find opportunities for product and process optimization.

- Strong programming experience with Python/R/SQL, with the ability to write well-documented production-level code.

- Practical knowledge & experience with statistical methods.

- Strong analytical and problem-solving skills; ability to work creatively in problem solving environment.

- Basic software engineering skills (Git, API, Docker Container, DevOps best practices).

- Knowledge of insurance data models and pricing methods is a plus.

- Experience with ML frameworks like PyTorch, TensorFlow or JAX is a plus.

- Experience with Spark and distributed computing is a plus.

- Experience with Azure cloud development is a plus.

- Available to start the internship in May 2023 and work a hybrid schedule in the Hartford, CT Office.

Contact me directly at nathan_lally@hsb.com when you apply!