



**XPLOREIQ**

**DISRUPTING THE WAY YOU EXPLORE THE WORLD**



# SGS - YOUR **TECHNICAL PARTNER** IN EXPLORATION

SGS knows the value of your exploration program and we have the technical and logistical skills to help you manage it. As part of our commitment to providing leading edge technical services, we have invested in advanced machine learning algorithms to provide value and insight into your exploration programs.

## SGS GEOLOGICAL SERVICES

With over 35 years of experience providing the mining industry with mineral resource estimation services using cutting edge geostatistical techniques; SGS Geological Services is known globally as the expert in 3D geological modelling and mineral resource - reserve evaluation.

We bring the disciplines of geology, geostatistics, and mining engineering together to provide you with accurate and timely mineral project evaluation solutions. We also offer a broad range of services to the mining and exploration industries to reduce risk and enhance value. We have the expertise to assist you in the following areas:

- Exploration services including customizable software solutions
- Ore body modelling and resource estimation within our own GENESIS™ software
- Mine engineering including optimization, design and scheduling
- Mine audits including resources, reserves, mine to plant reconciliation and technical due diligence
- Technical Reports (NI 43-101, JORC and SAMREC) and Desktop Studies
- Sample selection for metallurgical tests to ensure representativity
- Training and education on themes discussed above

With over 1,000 consulting projects completed worldwide, SGS Geological Services is well equipped to minimize your operational and financial risks. You can depend on our global technical leadership to ensure effective solutions to your exploration and mining challenges.



We have provided 3D geological modelling and resource estimation solutions for a wide array of commodities including:

- Gold and precious metals
- Base metals
- Iron ore
- Lithium
- Rare earth elements, niobium, tantalum
- Uranium
- Coal
- Industrial minerals (bauxite, barite, limestone for cement and lime, salt, sands with titanium bearing minerals etc.)

As part of the larger SGS Minerals group, we can draw upon our network of laboratories, metallurgists, process engineers and other professionals to help optimize your mineral project.

## **XPLOREIQ**

Machine learning is defined as using powerful statistical algorithms applied to large sets of geoscientific data to help identify correlations and trends. This eliminates the risk of missing data used to identify new prospective areas of mineralization found at depth within a property for drill testing. By using machine learning algorithms, XploreIQ adds value to both your historical and existing geoscientific data and justifies managing and maintaining extensive databases. Since winning the 2016 Integra Gold Rush Challenge, we have integrated machine learning in our

toolbox for key services offered to you for the creation of 3D geological modelling and domaining, exploration, and prospectivity targeting services.

As new precious and base metal deposits discoveries become more rare, and mining companies are required to be more efficient with their exploration spending, it becomes more important to be more accurate with targeting and creating an optimal drill campaign. Especially beneficial to deposits with high data density related to historical production or multiple decades of historical exploration work, our XploreIQ can help you determine any further potential for mineral resource expansion (at depth and/or within mine site area) and quantifying and justifying the risk of your exploration investment. By including XploreIQ into your exploration plan, we can help you to save money and realize a quicker return on your exploration investment, leaving you with an efficient and cost-effective path forward into your next drill season.

We have earned our leading position in the mining industry with our blend of professionals with practical mining and geological experience, world-renowned geostatistical knowledge, and by pioneering mineral software technology. We developed machine learning algorithms to identify correlations between multiples set of data, the predictors, and a single targeted feature.

Quality of the algorithm is critical, but the key feature is the workflow and the statistical treatment applied to the mineral exploration data set.

Often data produced by exploration is poorly suited to direct application of machine learning techniques whereby geological data is plagued with issues requiring special care and treatment at several steps along the process to avoid spurious results.

## ALGORITHMS IN USE

### Specialized Phylogenetic Algorithm Process

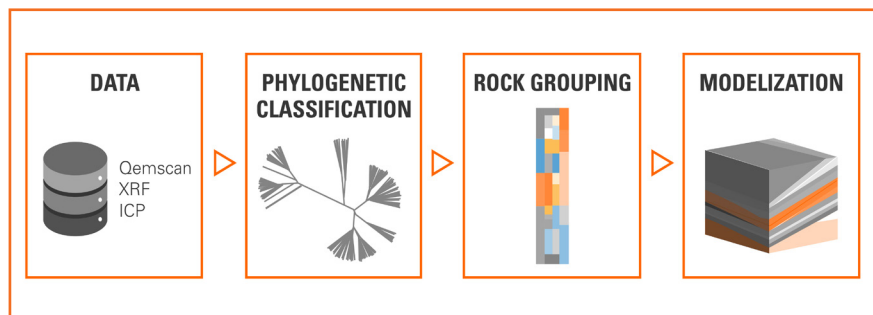
- The evolutionary study field of biology has been good at automatically classifying evolutionary differences in species DNA data set.
- Adapted by SGS Geological Services to work on the same principle with rock/litho geochemistry and mineralogical components defined by starting from a common ancestor (fresh rock/protolith) and its evolution through time.
- Used during the interpretation phase to identify rock class and create lithological groups which serves as a starting point for 3D geological modelling.

### Boosted Classification Trees Algorithm Process

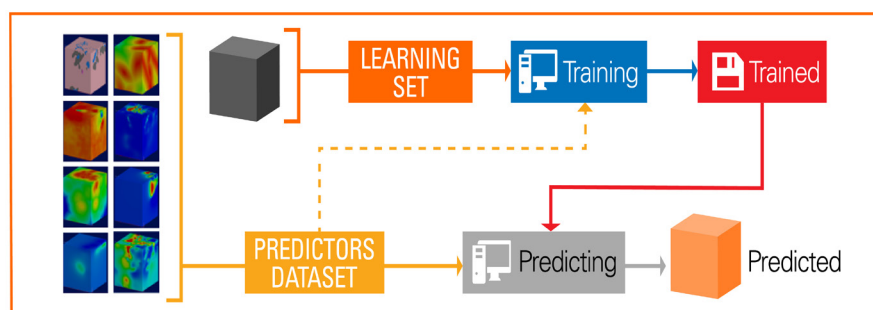
- Boosting builds an ensemble of classifiers from the different variables and combined into a robust classifier
- The algorithm is adaptive and aims at lowering the prediction error to the lowest percentage
- Decision trees are good for determining non linear correlation(s) of data sets

### Bayesian Gaussian Latent Variable Process

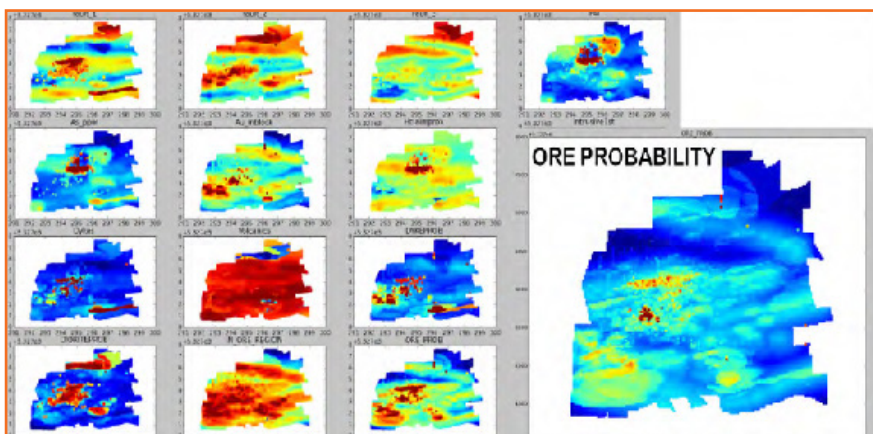
- Brings the variable in question into a Bayesian distribution
- Can predict the variable in a latent space and verify/ validate the variable with the best impact on the predictor.
- Performs well in facial recognition environments and dimensional visualization of the predictors.
- The algorithm was designed for non- linear correlation of variables to predictors
- Good to handle missing data



Specialized Phylogenetic Algorithm Model



Boosted Classification Trees Algorithm Model



Bayesian Gaussian Latent Variable Process Model



## COMMODITIES OF INTEREST

XploreIQ is best applied to the traditional commodities of base and precious metals. Also, in keeping with our commitment to service emerging markets, XploreIQ can help you with your REE, battery metals and cobalt projects.

## COMPLIMENTARY SGS SERVICES TO ASSIST IN THE COLLECTION OF DATA

For XploreIQ to be successful, we rely on data density to provide a more complete representation of your deposit or exploration target. Through other groups within SGS, we offer state-of-the-art technology that can be used to receive near real-time data in the field, which can be verified by our stringent QA/QC protocols. These technologies include:

- IR technologies for mineral quantification
- MMI™ for exploration asset identification
- pXRF for elemental quantification
- Collaboration with Minalyze AB using Minalyzer CS for core logging (available in specific geographies)



## WHAT DOES THIS MEAN FOR YOU?

With little investment, we can use XploreIQ to build an effective exploration campaign, seamlessly integrating the service into a larger set of project services. You will gain a more complete knowledge of your deposit or resource by understanding the various domains and attributes. We can build a customizable package of services to take your project from exploration, through feasibility and construction and into production, making SGS a true one-stop-shop for your project needs. By partnering with SGS early on, you will realize a higher return on investment and exceed the demands of your stakeholder, bringing your product to market quickly.

## CONTACT US

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