Project/Client Name:
Contract Anonymity

Application Name:
PVL Intervention

Industry Served:
Healthcare/Clinical Decision Support Accelerator

Domain:
Healthcare

Category of Application:
Web Application Portal

Technologies Used:

- Matlab
- R
- Python
- WEKA
- **Backend Database** Microsoft SQL Web Logic v8.1
- **Data Files as Model Input** - MS Excel, Text & CSV format
- **Design Framework Architecture** - MS Visio & MS Word
- **Prime Web Application** - HTML & .Net

Project Duration:
10 months

About The Client

The client is one of the nation's premier children's hospitals. They are committed to identifying innovative technology for improved patient care.

Business Need

Healthcare organizations are seeking predictive analytics technology to identify patients at high risk of chronic conditions, complications, or expensive treatments. Predictive technology enables physicians with the appropriate data to perform the right interventions at the right time.

Almost 12% of all infants are premature. An alarming one in four premature newborns has congenital heart disease and almost 30% of infants are vulnerable to neurological damage. These statistics are indicators for critical care attention and are at high risk of developing periventricular leukomalacia (PVL). PVL is characterized by death of white matter brain cells close to the area called brain ventricle.

Our clients' request was to develop a unique predictive analytics accelerator for PVL. Our predictive algorithm identifies vulnerable infants and alerts doctors to the proactive critical care interventions specific to each patient.

As requested, we developed a patient specific predictive analytics accelerator for clinical decision support systems, which positively identified hidden patterns in complex clinical data. This resulted in targeted intervention timelines to prevent or reduce the effects of PVL. Our innovative and proprietary algorithm combines machine learning, physics, non-linear dynamics, concepts of time scale, and clinical expertise enabling organizations to significantly improve care interventions and long term outcomes.

The power of our preventive prediction solution for PVL has been validated via the environment in Philadelphia's finest children's hospital.

Key Challenges

Currently PVL detection is treated as a diagnosis problem. PVL may not be apparent until months later. Each infant may experience symptoms differently. The most common symptom of PVL is a form of cerebral palsy characterized by tight, contracted muscles, especially in the legs. The symptoms of PVL may resemble other conditions making diagnosis difficult. One way to detect PVL is by MRI imaging and a second comparative MRI one week after. At this stage it is very late to intervene. Hence, the timing of the second MRI is crucial for intervention and appropriate care. An alternative method is a cranial ultrasound looking for cysts or hollow spaces in the brain tissue. However, these symptoms may appear immediately causing difficult diagnosis.

As a result we need to be able to integrate the nonlinear systems modeling, physiological knowledge, clinical expertise, and machine learning techniques in a unified rational framework which is capable of exploiting the advantages of each of these methods to provide a more accurate and informative decision support.

Prime Technology Group, LLC. 940 West Valley Rd. Suite 1500. Wayne, PA 19087
Phone: 610.205.8740 | Fax: 610.265.3995

Prime Team Size:
7

Prime Solution

Our client requested a solution to identify hidden patterns to positively intervene when infants are at high risk of neurological damages such as PVL. Prime engineers successfully identified the complexity of the Patho-Physiological condition under study. We have the tools to model, simulate and analyze complex diseases.

Our predictive analytics algorithm provides organizations the ability to identify patients who are at risk of complications by identifying timely interventions before chronic conditions associated with PVL occur. A new predictive analytics framework has been developed based on the vital sign measurements, blood gas, and lab results to predict the PVL occurrence after neonatal heart surgery. The solution applies wavelet transform on the data to extract time-frequency information from data, we also use nonlinear dynamics analysis to extract valuable information from the data. We then feed this data into a machine learning classifier which is capable of predicting the outcome.

Application Screenshots

Client Benefits

Our predictive analytics engine has been able to unlock targeted timelines of critical interventions to prevent the onset of PVL. Our innovative and proprietary algorithm combines machine learning, physics, non-linear dynamics, concepts of time scale, and clinical expertise enabling organizations to significantly improve care interventions and long term health outcomes. Primes' predictive algorithm identifies crucial data within the first twelve hours after the surgery. Furthermore, this advanced predictive accelerator provides actionable information for the physician to review and intervene. This capability has a success rate of 92% accuracy. Once implemented the solution is not only capable of producing precise predictions it also improves patient care through providing actionable information. Drastically reducing complications associated with PVL, chronic conditions, expensive treatments, and risk for readmissions.

Prime Technology Group, LLC. 940 West Valley Rd. Suite 1500. Wayne, PA 19087
Phone: 610.205.8740 | Fax: 610.265.3995

In Addition:

- Our innovative and proprietary algorithms combine machine learning, physics, non-linear dynamics, and clinical expertise.
- The solution provides a flexible, vendor agnostic, logical "analytics" eco-system that extracts hidden patterns from existing data in a customizable solution.
- Powerful and accurate predictions in a timely manner.
- Proven centralized reporting dashboards for each specific disease such as, periventricular Leukomalacia (PVL), ICU outcomes, and diabetes.
- Our elite accelerator provides critical decision response aid.
- Primes' premium predictive analytics surpasses "out of the box" predictive analytics.
- Only Primes' propriety algorithm's deep dive to calculate and organize the appropriate patient specific data sets informing doctors of critical care interventions at the discretion of the physician.
- We offer document-centric workflows to automate complex professional processes.
- Instantly capture actionable process metrics that are vital for research.

Prime Technology Group, LLC. 940 West Valley Rd. Suite 1500. Wayne, PA 19087
Phone: 610.205.8740 | Fax: 610.265.3995

About Prime

Prime Technology Group is a global, technology services company where innovation is at the core of our business engagements. We develop cutting-edge solutions and carefully select the best Information Technology professionals locally and globally to become ambassadors of your business. This approach maximizes our ability to leverage our award-winning team and their competencies. Prime is the conduit which bridges the immediate business solutions today to the technology advances of tomorrow.

Our candid ability and forethought has enabled us to navigate seamlessly, bridging the appropriate technology solutions that outlast today's technology trends. Assigned team leaders identify poignant solutions and fuse the appropriate framework and infrastructure necessary for unlocking your capabilities.

Prime Technology Group is organized into four technical practices;

- Cloud (Google PAAS, Microsoft Azure)
- Mobility (IBM Work Lite)
- Analytics (Big Data, Predictive Analytics)
- Quality Assurance

Prime develops customizable frameworks, driven by our robust R & D, which become the cornerstone of our solution offerings. Our philosophy in flexibility allows us to leverage our award-winning resources and competencies to exceed our clients' expectations while improving their bottom line.

We have successfully helped hundreds of clients in Healthcare, Insurance, Life Sciences, Banking, Financial Services, and E-commerce. Our imprint has drastically impacted client growth; we are Prime Technology Group, where we are "Bringing visions to life."

To know more about our services, please visit www.primetgi.com.

Prime Technology Group, LLC. 940 West Valley Rd. Suite 1500. Wayne, PA 19087
Phone: 610.205.8740 | Fax: 610.265.3995