Alberto Moscatelli - Portfolio

Data Analytics

- Prescriptive analytics for an equity derivative contract (case#SA)
  We have to compute the **price of a financial derivative** contract ('Equity Accumulator') that is defined through a set of future, daily buy/sell clauses defined up-front, but the price function is non-linear, and good profitable rules can only be identified by *pure guesswork*.
  We implement a ***goal-seeking*** loop that fine-tune the contract clauses so as to minimize the downside risk. We find a framework that requires very limited adaptation to the program code to make it **parallel**, and we run it in the Cloud on a scalable architecture.
- Association rule mining (case#RM)
  Two large risk-management reports are generated by similar pricing systems, exhibiting a multitude of significant and minor variances that is *hard to grasp*.
  We infer the main patterns of such differences using the ***Market Basket Analysis*** approach with the support of ***big data*** technologies executed in the Cloud.
- Entity resolution for cross-sectional reports (case#ER)
  We aim to construct an economic report that requires matching entities that different online sources publish *under different names*.
  We try three different ***record linkage*** approaches (No-code, Low-code and Full-code or, bespoke/off-the-shelf), we compare their **statistical performance** and we present the final report.
- Deductive engine (case#DS)
  We want to build an ***expert system*** that will help us solve a **popular board game** by following a set of simple rules. We opt for logic programming as a means of adhering to XAI - explainable artificial intelligence. Following the CRISP-DM framework, we design a prescriptive-analytics process that identifies the strategy that will help the solver crack the secret code with the minimum number of guesses.
- Text mining on unstructured data (case#UM)
  Some market-sentiment information (bullish/bearish) is published in a report with a layout that is pleasant to the eye but *not easy to use in Excel*.
  We extract the information selectively by following a strict-parsing approach (based on regex) and a shallow-parsing approach (based on CRF, a sequence-labeling ***supervised*** machine-learning predictor).

and,

- DIY parallel computing (case#CP)
  We have to run a process on a large set of files that we want to execute in parallel, but we can't install any cool distributed software in our corporate Windows™ LAN.
  We implement a Do-It-Yourself ***zero-config map-reduce*** workflow that requires a bit of implementation of parallel computing logic but NO configuration on the worker nodes.
- Object-relational database
  We want to keep our transactional records stored in a database with the ***highest possible consistency enforcement***.
  We design a model based on the table-inheritance feature of a popular SQL database.
- Time-machine database
  We want to keep our transactional records stored in a database with the ability to query the data as of past date.
  We design a model based on the ***data-versioning*** feature of a popular SQL database.

Live Applications - Cloud SaaS

- The custom web app “multiccy„ (case#LR)
  We develop a secure web application (SaaS) to help you keep track of your multi-currency bank accounts assets and monitor the FX 1-month exposure with a Value-at-Risk predictive report.
  We deploy and provide a Live service on the Cloud.
- This website (case#CW)
  We choose a software to set up a portfolio website, with excellent support for making diagrams, and we choose how to deploy it on the cloud with cost optimization and zero-maintenance in mind.
- The custom web app “planner„ (case#BP)
  We develop a long-term personal planner web application (SaaS), to help you schedule long tasks through a simulation algorithm that suggests a global schedule with the best variety within the given constraints of time and proportions.
  We deploy and provide a Live service on the Cloud.

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