



PEAKS²TAILS



TRANSFORM **RISK** INTO **OPPORTUNITY**

TRAINING | SOLUTIONING | MENTORING

ABOUT PEAKS2TAILS

Peaks2Tails is a global leader in Risk Modelling, Quantitative Analytics, and Financial Training, empowering banks and financial institutions to stay ahead of regulatory, technological, and market shifts with insight, precision, and innovation.

Founded in 2018 by seasoned risk professionals **Satyapriya Ojha and Karan Aggarwal**—both holders of the prestigious **FRM®** (Financial Risk Manager) and **CQF®** (Certificate in Quantitative Finance)—Peaks2Tails was established with a singular goal: to bridge the gap between theory and real-world implementation in financial risk management.

With online operations across the world, we specialize in building deep technical capabilities for credit risk, market risk, and quantitative analytics teams across leading banks, fintechs, and regulatory institutions.

In today's fast-evolving financial landscape, risk is not just a challenge it's an opportunity.



INDUSTRY RECOGNITION

We are proud to be recognized for our impact and excellence:



Best Credit Risk Training Program



Liquidity Risk Solution of the Year

These accolades reflect our commitment to delivering future-ready, high-impact solutions and training in the financial risk domain.

T CREDIT RISK TRAINING & DEVELOPMENT PROG



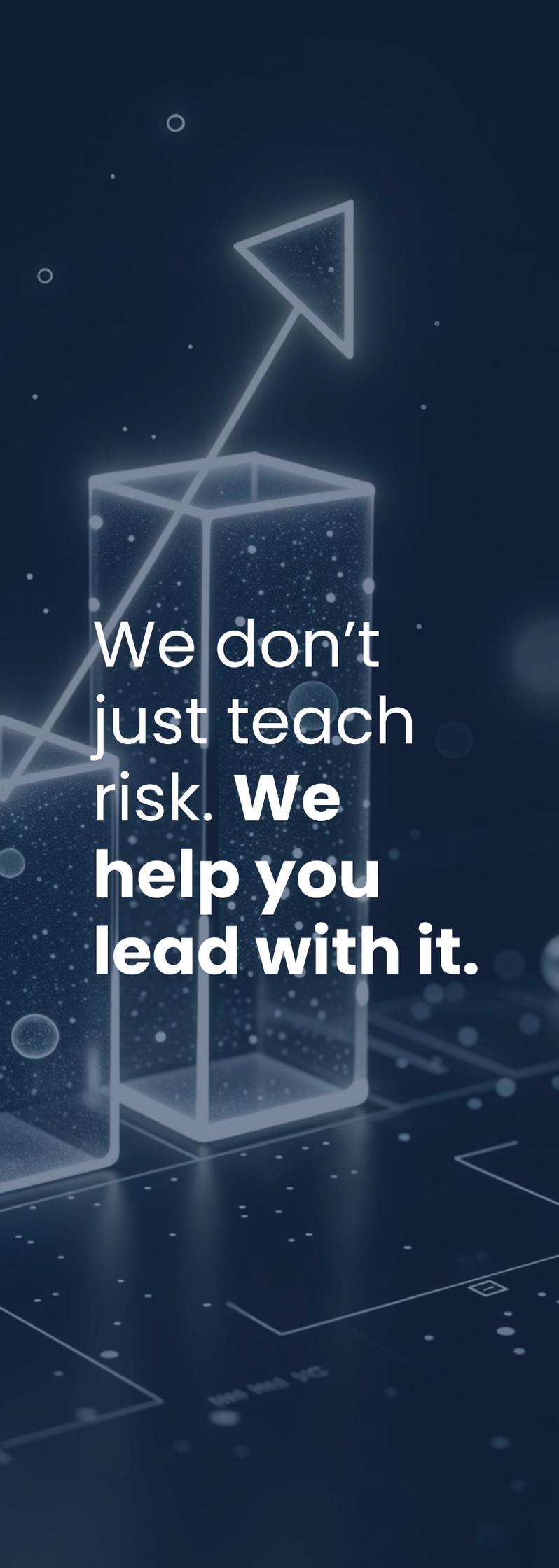
WHAT WE OFFER

Training- Our flagship programs are designed for teams and professionals looking to master practical, tool-driven skills in credit risk modelling, IFRS 9 / CECL, AI/ML for finance, and Python/R for risk. Delivered by industry practitioners, our training is rigorous, hands-on, and tailored to current regulatory and business demands.

Solutions-

We support institutions in designing, validating, and operationalizing end-to-end risk frameworks. From PD/LGD/EAD models and scorecard development to transition matrices, stress testing, and IRB alignment—our solutions are implementation-focused and audit-ready.

Mentoring- Through our long-term mentoring engagements, we help risk teams evolve from spreadsheet-driven analysis to explainable AI and automated decisioning. Our mentoring covers model governance, validation readiness, and capability building, ensuring sustainable excellence.



We don't
just teach
risk. We
help you
lead with it.

1. Mastering Credit Risk Modelling

225+ Hours | Excel + Python | End-to-End Implementation

At **Peaks2Tails**, we don't just teach credit risk—we architect mastery. Our Credit Risk Modelling program is a comprehensive journey from loan origination to regulatory capital calculation, designed for banking professionals who want to lead with insight and innovation.

What You'll Learn



Foundational Clarity-

Understand the full loan lifecycle, model categories (Scorecards, Basel, IFRS 9, Stress Testing), and hands-on data preparation using our proprietary MENTOS platform.



Scorecard Development-

Build powerful Application and Behavioural Scorecards. Go beyond stats with policy rules, overrides, reject inferencing, and cut-off optimization techniques using real-world mortgage data.



Loss Modelling, PD, LGD & EAD-

Model every aspect of credit loss using cutting-edge methods:

- Survival Analysis, Tobit, Fractional Logit for LGD
- Logistic Regression & Machine Learning for PD
- Component-Based & CCF Regression for EAD



Basel & IFRS 9 Mastery-

Gain fluency in converting TTC to PIT, term structure modelling, transition matrices, and staging assessments. Implement end-to-end capital charge calculations under the Basel IRB and IFRS 9 regimes.



Actuarial & CECL Techniques-

Explore Actuarial models (Cox, APC, Bayesian), WARM, and Snapshot/Open Pool methods with Excel-driven hands-on training.



Wholesale & Low Default Portfolios-

Model Transition Matrices and address LDP challenges using Pluto Tasche, Bayesian, and Van Der Burgt approaches.

EAD Term Structure

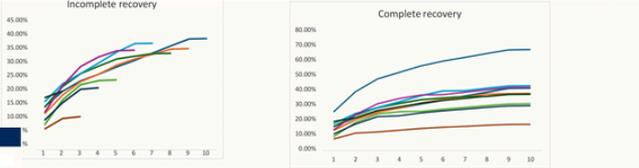


EAD TERM STRUCTURE MODELLING. Model Output: Qtr 9, EAD INR 95,829.22. Macro Economic Forecast table with columns for Year, Scenario, and various economic indicators.

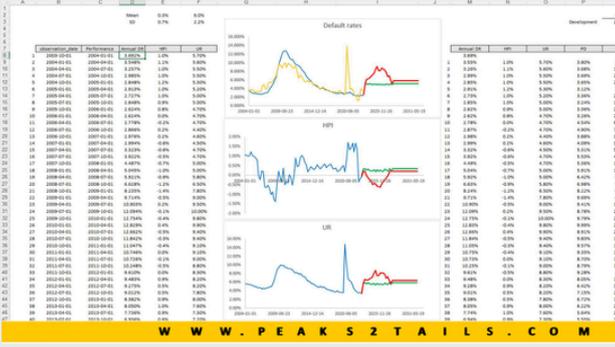
LGD Chain Ladder



LGD Chain Ladder table showing Year of Default (2008-2017) and CLM Factor (0.5239 to 0.0417). Includes a 'Sum Recovery' column and an 'Average' value of 61.41%.



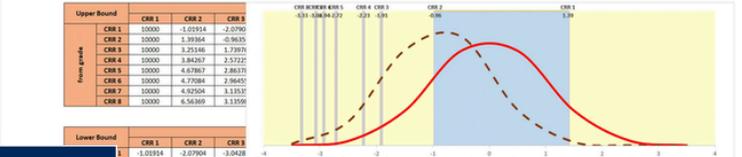
Macro economic Model



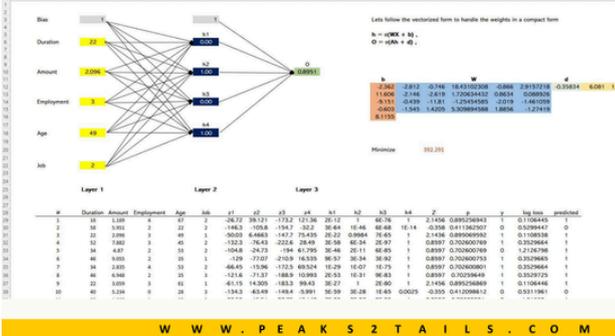
Transition Matrix



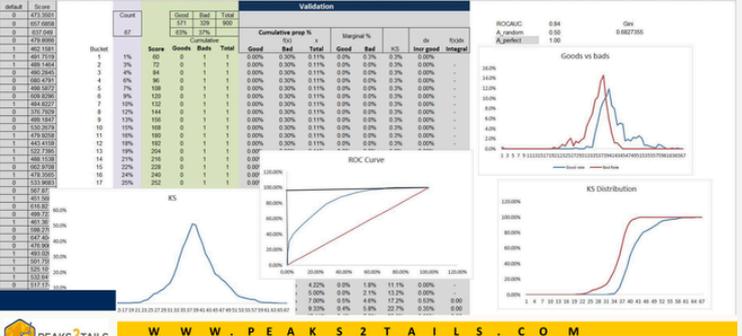
Transition Matrix table showing probabilities between CRR 1 to CRR 9. Includes a 'from grade' column and a 'to grade' column.



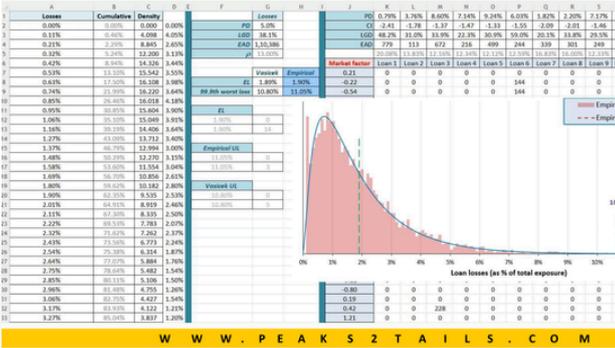
ML Neural Networks



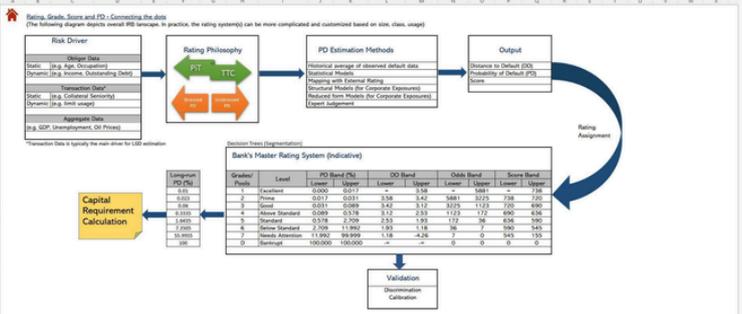
Model Validation- ROC & KS



Loss Distribution



Master Rating System



► **Stress Testing & Model Validation**– Perform CCAR/DFAST simulations, ARIMA/ARIMAX modelling, and multi-regression VECM models. Rigorously validate scorecards, capital models, transition matrices, and IFRS 9 components using SR 11-07 checklists.

► **Quant Meets Practical**– Price loans with RAROC, optimize yields, and apply machine learning (LDA, XGBoost, SVM, Neural Nets) for advanced credit analytics.

Outcome:

You will walk away with not just theoretical proficiency but also the practical ability to implement, validate, and govern complex credit models across the banking spectrum.

SCORES NORMALISATION

Score Normalization

Goal is to score the entire data set
Odds 72 : 1 is anchored at score 660 as per standard
An increment of score 40 doubles the odds of not defaulting

So we have
In (odds) = a + b * Score
ln(72) = a + 660b
ln(36) = a + 620b

Solving b = 0.01732868
 a = -7.16026236

Training + Testing Data Set

Score Distribution

As expected, the score is concentrated at high scores indicating low credit risk

Note that , we are able to derive scores from PD estimates
If softwares produce score as direct output, it's easy to backtrack PD using the same

IRB in BASEL requires account to be mapped to a rating.
IFRS/CECL does not require mapping to a rating

Default	Intercept	bureau_score	max_arreas_12m	cc_util	annual_income	num_ccj	emp_length	months_since_recent_cc_delinq	P(1)	ln(odds)	Score
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.324421315	0.182549259	0.519371295	-0.379586857	0.005726	5.156941	710.7988
1	-2.91589321	0.848988348	0.446897907	-0.739993	0.324421315	0.182549259	-0.382216378	-0.359844634	0.042151	3.123443	593.45
0	-2.91589321	1.075105467	0.446897907	1.14072113	0.659648047	0.182549259	0.88879147	1.036190088	0.001349	6.468351	786.4773
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.056834275	0.182549259	-0.180192003	-0.359844634	0.009019	4.699408	684.3955
1	-2.91589321	-0.221210523	-1.708298136	-1.912945	-0.641267459	-0.23121052	-0.306787205	-0.359844634	0.773509	1.22823	342.1243
0	-2.91589321	-0.100424502	0.446897907	1.14072113	-0.641267459	0.182549259	-0.86040385	1.036190088	0.018264	3.984364	643.1319
0	-2.91589321	-0.100424502	0.446897907	1.14072113	0.659648047	0.182549259	0.627726273	1.036190088	0.003636	5.61316	737.1261
0	-2.91589321	1.075105467	0.446897907	1.14072113	0.659648047	0.182549259	-0.180192003	-0.359844634	0.004639	5.36869	726.5892
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.659648047	0.182549259	0.439573656	-0.359844634	0.004361	5.430569	726.5892
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.324421315	0.182549259	0.520370796	-0.379586857	0.005724	5.157279	710.8182
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.659648047	0.182549259	0.519371295	-0.379586857	0.004429	5.447089	727.5425
0	-2.91589321	0.848988348	0.446897907	-0.739993	-0.641267459	0.182549259	-0.306787205	-0.359844634	0.090044	2.313101	546.687
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.659648047	0.182549259	0.211585475	-0.359844634	0.004709	5.353535	722.1437
0	-2.91589321	1.075105467	0.446897907	-0.739993	0.324421315	0.182549259	0.211585475	-0.359844634	0.030131	3.471612	613.5421
0	-2.91589321	-1.178027211	0.446897907	1.14072113	0.324421315	0.182549259	0.627726273	-0.379586857	0.020412	3.871016	636.5908
0	-2.91589321	0.848988348	0.446897907	-1.912945	0.056834275	0.182549259	0.519371295	1.036190088	0.054672	2.850179	577.6806
0	-2.91589321	-0.100424502	0.446897907	-0.739993	0.324421315	0.182549259	-0.306787205	-0.359844634	0.073817	2.52948	559.1737
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.659648047	0.182549259	0.439573656	-0.379586857	0.004407	5.426126	725.5866
0	-2.91589321	-0.694950808	0.446897907	1.14072113	0.324421315	0.182549259	0.519371295	1.036190088	0.007355	4.905014	696.2406
0	-2.91589321	0.848988348	0.446897907	1.14072113	0.324421315	0.182549259	0.211585475	-0.359844634	0.006284	5.063388	705.4

2. Deep Quant Finance

200+ Hours | Excel + Python | From Theory to Trading Floors

Quantitative Finance is the language of the modern financial system—and we teach it fluently. **Peaks2Tails** presents a rigorous, math-intensive program to equip you with the quantitative, computational, and algorithmic skills required to thrive in today's data-driven markets.

What You'll Master

- **The Core Building Block** – Start with a robust **Math, Python & Stochastic Calculus Primer**, covering everything from Taylor series and convex optimization to Ito calculus and Girsanov's theorem. Learn to simulate stochastic processes and build pricing engines from scratch.
- **Portfolio Science & Optimization**– Understand Modern Portfolio Theory, Black-Litterman, CAPM, and factor models. Master robust optimization, dynamic asset allocation, and statistical arbitrage with real-world implementation via Python projects and Excel modelling.
- **Derivatives: Theory to Practice**–
 - **Equity Derivatives:** Price Vanilla, Barrier, American, and Exotic options using Binomial Trees, Black-Scholes, Finite Difference & Monte Carlo methods. **Stochastic Models:** Local & Stochastic Volatility (SABR, Heston), Jump Diffusions, COS Method, Affine Jump Processes.
- **Interest Rate & FX Derivatives**– Price and manage Swaps, Swaptions, FRAs, FX options, and multi-currency curve construction. Dive into post-LIBOR RFR regimes (e.g., SOFR), CCP basis adjustments, and automatic differentiation for sensitivity risk.

▶ **Credit Derivatives**- Model and value CDS, CLNs, Basket products using structural and reduced-form (intensity) models. Learn Copula-based dependency structures and hazard rate calibration.

▶ **Artificial Intelligence in Finance**-

Apply **AI/ML** to solve real quant problems:

- Neural networks for derivative pricing
- XGBoost & Random Forest for forecasting
- LSTM for time series prediction
- Reinforcement Learning for portfolio optimization
- CNNs for volatility surfaces
- LLMs in algorithmic finance workflows

Capstone Projects

- Stochastic Process Simulation
- Dynamic Portfolio Optimization
- Credit Risk Modeling with Transition Matrices
- Pricing Engines for Derivatives
- Monte Carlo Engines for Path-Dependent Options
- SOFR-Based Interest Rate Curve Construction
- AI Models for Pricing, Risk, and Allocation



**200+ Hours
Excel +
Python**

Master derivatives, portfolio optimization & AI in finance through advanced quant techniques.

BROWNIAN MOTION

dt = 0.01

T = 1

n = 100

Y(T) = 1.52816

T	#	step	walk
0	0	0	0
0.01	1	-0.026	-0.026
0.02	2	-0.044	-0.044
0.03	3	-0.2741	-0.3045
0.04	4	-0.0097	-0.3142
0.05	5	-0.0714	-0.3856
0.06	6	0.0699	-0.3159
0.07	7	0.2063	-0.1096
0.08	8	-0.109	-0.2188
0.09	9	-0.0652	-0.3039
0.1	10	0.10424	-0.1997
0.11	11	0.12245	-0.0772
0.12	12	0.4287	0.3514
0.13	13	0.03317	0.002
0.14	14	-0.0572	-0.0573
0.15	15	0.10665	0.04931
0.16	16	0.02951	0.07882
0.17	17	-0.1493	-0.0605
0.18	18	0.18729	0.09683
0.19	19	-0.1607	-0.0639
0.2	20	-0.0835	-0.1473
0.21	21	0.14109	-0.0062
0.22	22	-0.0425	-0.0487
0.23	23	0.14715	0.0902
0.24	24	-0.1664	-0.0674
0.25	25	0.06057	-0.0068
0.26	26	-0.0657	-0.0725
0.27	27	-0.1799	-0.2525
0.28	28	-0.0187	-0.2711
0.29	29	0.02214	-0.249
0.3	30	0.12223	-0.1267
0.31	31	0.0376	-0.0891
0.32	32	-0.0478	-0.137
0.33	33	0.06693	-0.07
0.34	34	0.01137	-0.0567
0.35	35	-0.0995	-0.1521
0.36	36	0.04368	-0.1084
0.37	37	-0.0679	-0.1764
0.38	38	-0.0599	-0.2363
0.39	39	-0.0403	-0.2766
0.4	40	0.02725	-0.2493
0.41	41	0.05459	-0.1947
0.42	42	0.03502	-0.1587

Random Walk

Histogram of Y(T)

$dW \sim N(0, dt)$

$W(T) = \int_0^T dW \sim N(0, T)$

Brownian Increment
 $E[dW] = 0$
 $V[dW] = dt$

Brownian Motion
 $E[W] = 0$
 $V[W] = T$

HO-LEE CALIBRATION

Ho & Lee Model - Calibration of theta

$dr(t) = \theta(t)dt + \sigma dW$

$r(t) = r(s) + \int_s^t \theta(u)du + \sigma Z\sqrt{t-s}$

$P(t, T) = A(t, T)e^{-r(t)B(t, T)}$

Risk Neutral Calibration

$\sigma = 0.0070$ (calibrated from caplet prices)

$r(0) = 4.520\%$ (rate short end)

$dt = 0.5$

$B(t, T) = T - t$

$A(t, T) = \exp\left\{-\int_t^T \theta(s)(T-s)ds + \frac{1}{6}\sigma^2(T-t)^3\right\}$

(analytical) $\theta(T) = \frac{\partial f(0, T)}{\partial T} + \sigma^2 T$

θ_i θ_j

$T_0 = 0$ T_{i-1} T_i T_{j-1} $T_j = T$

$\int_0^T \theta(s)(T-s)ds = \frac{1}{2}\theta_j(T_j - T_{j-1})^2 + \frac{1}{2}\sum_{i=1}^{j-1} \theta_i [(T_j - T_{i-1})^2 - (T_j - T_i)^2]$

$\theta_j = \frac{2}{(T_j - T_{j-1})^2} \left(-\ln P(0, T_j) - r(0)T_j + \frac{1}{6}\sigma^2 T_j^3 - \frac{1}{2}\sum_{i=1}^{j-1} \theta_i [(T_j - T_{i-1})^2 - (T_j - T_i)^2] \right)$

Today	0.00	spot rate	P(0, T) ^{obs}	f(0, T)	θ	A(0, T)	B(0, T)	P(0, T)
T0	0.5	4.5200%	0.977653467	4.520%	0.0008%	1.000000	0.50	0.977653467
T1	1	4.5680%	0.955347625	4.616%	0.388%	0.999520	1.00	0.9553476245
T2								0.933116705
T3								0.910993060
T4								0.89007151
T5								0.867187554
T6								0.845560972
T7								0.824152247
T8								0.802984394
T9								0.782078625
T10								0.761454393
T11								0.741129430
T12								0.721119798
T13								0.701439940
T14								0.682102731
T15								0.663119542
T16								0.644500294
T17								0.626253524
T18								0.608386444

P(0, T)

$\theta(t)$

Deep Quant Finance

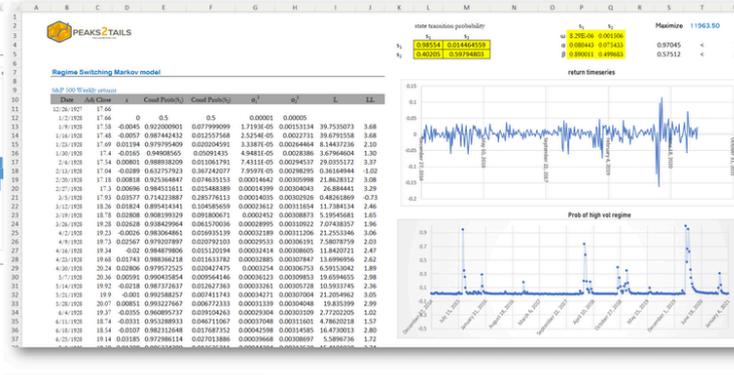
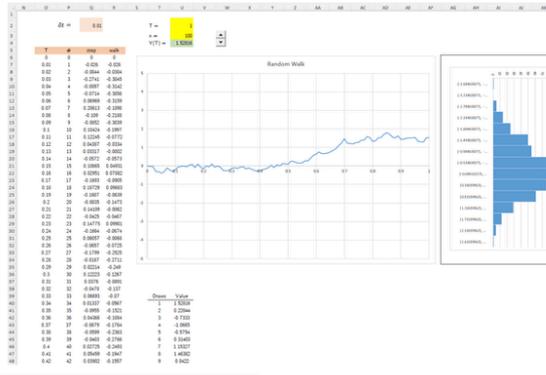
Stochastic Process

Deep Quant Finance

Volatility Models

Brownian Motion

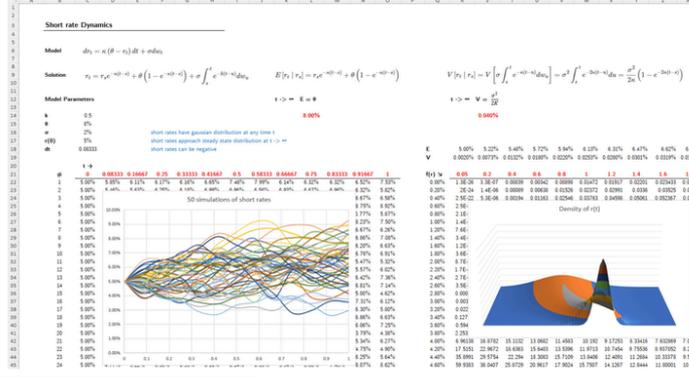
Regime Switching volatility Models



Deep Quant Finance

Term Structure Models

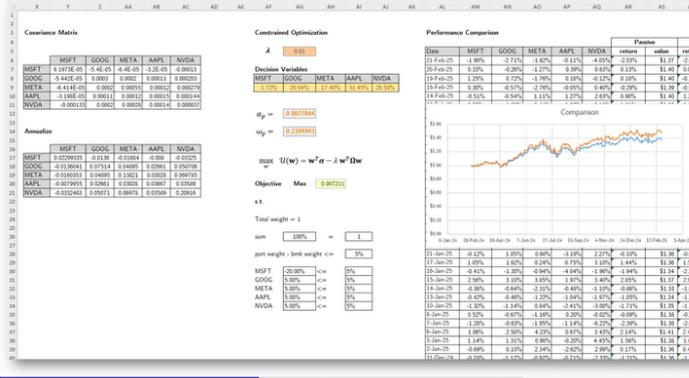
Vasicek Model - Short rate dynamics



Deep Quant Finance

Portfolio Management

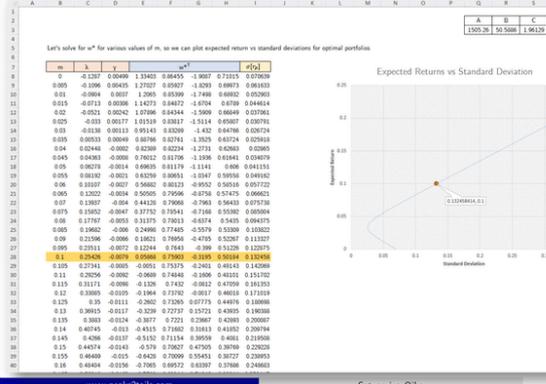
Portfolio Optimization



Deep Quant Finance

Portfolio Management

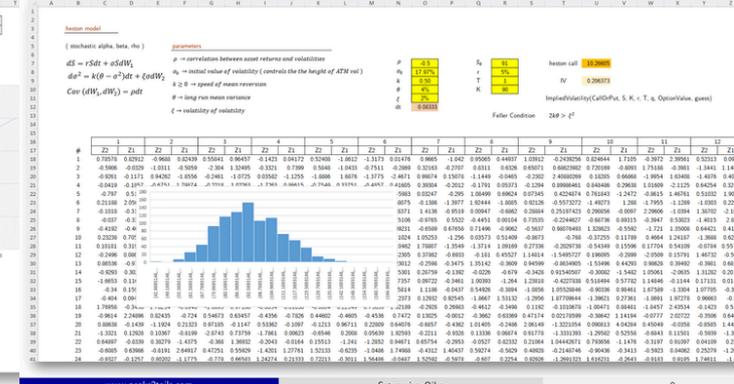
Efficient Frontier and GMVP



Deep Quant Finance

Volatility Models

Heston Model



3. Market Risk & Counterparty Credit Risk

180+ Hours | Python + Excel | Built for Risk, Valuation & Capital Experts

As global financial institutions align with evolving regulations like FRTB and SA-CCR, risk professionals must master both the theoretical frameworks and real-world execution of risk, pricing, and capital strategies. **Peaks2Tails** delivers a powerful, end-to-end program built for Market Risk, CCR, and Regulatory Capital functions.

What You'll Master

▶ Python for Risk Modeling –

Start with foundational and advanced Python modules—then move into building custom classes for:

- Black-Scholes Pricing
- Monte Carlo Simulation for VaR & xVA
- Sensitivity Engines for Vanilla & Exotic Options

▶ Core Market Risk Frameworks–

Gain fluency in:

- Value at Risk (VaR) and Expected Shortfall (ES) across asset classes
- Taylor Series expansion & Sensitivity Algebra
- GARCH, EWMA, EVT, Copulas for volatility & tail modelling

▶ FRTB Standardized & Advanced Approaches –

Learn how to calculate capital charges under:

- **SA:** Delta, Vega, Curvature,
- DRC for Equity, Rates, FX, and Commodities
- **IMA:** IMCC, Backtesting, PLAT

Hands-on Excel & Python-based projects for capital computation and regulatory alignment.

▶ **Derivative Valuation Deep Dive –**

From **Black–Scholes PDEs** to **Term Structure Models** like Hull–White, CIR, Vasicek—develop robust pricing engines across:

- **Interest Rate Derivatives:** Swaps, FRAs, Caps/Floors
- **FX Derivatives:** Forwards, Swaps, xCCy, Options
- **Volatility Modelling:** Local & Stochastic Volatility, Dupire, Greeks, Pathwise Sensitivities

▶ **Counterparty Credit Risk (CCR)–**

Master modelling of **Expected Exposure (EE)** and **Potential Future Exposure (PFE)** for portfolios across IR, FX, and Equity derivatives. Learn:

- **Netting, Collateral, CVA/DVA, xVA Adjustments**
- **SA-CCR & IMM Capital Charges**
- **BA-CVA & SA-CVA under Basel Regulations**

▶ **Advanced Sensitivities & Hedging –**

Calculate fast Greeks and sensitivities using:

- **Pathwise & Likelihood Ratio Methods**
- **Tangent & Adjoint Modes for Monte Carlo Simulation**

Apply these in hedging interest rate and FX risks using swaps, swaptions, and forward contracts.

▶ **Model Validation for Risk Governance–**

Perform rigorous validation with:

- **Backtesting, PIT Testing, Kupiec & Christofferson Tests**
- **Conditional & Unconditional Coverage Testing**
- **Excel toolkits for FRTB and CVA models**

Capstone Projects Include:

- Python Engine for Monte Carlo VaR & ES
- FRTB Capital Charge Simulator
- Exposure Engine for SA-CCR and IMM
- CVA Capital Toolkit for BA-CVA & SA-CVA
- Derivative Pricing & Sensitivity Engines
- End-to-End Validation Suite for Risk Models

Market Risk & Counterparty Credit Risk

Basel - Maturity Ladder

FRTB(SSA)

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Market Risk & Counterparty Credit Risk

Equity - Delta Risk Charge

FRTB(SA)

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Market Risk & Counterparty Credit Risk

Yield Curve Simulation

Exposure Modeling

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Market Risk & Counterparty Credit Risk

Exposure Profile - Forward Swap

Exposure Modeling

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Market Risk & Counterparty Credit Risk

FRTB - IMA

Risk Measures

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Market Risk & Counterparty Credit Risk

Default Risk Charge (DRC)

FRTB(SA)

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Market Risk & Counterparty Credit Risk

SA-CVA (IR-Delta)

Counterparty Credit Risk

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Market Risk & Counterparty Credit Risk

Rate and FX Derivative valuation library

Derivative Valuations

www.peaks2tails.com Satyapriya Ojha 9

4. Asset Liability Management (ALM)

100+ Hours | Excel + Python | ICAAP | ILAAP | IRRBB Mastery

Managing a bank's balance sheet isn't just a regulatory requirement—it's a strategic advantage. At **Peaks2Tails**, our ALM curriculum empowers Treasury, Risk, and Regulatory professionals to lead with precision, compliance, and forward-looking insight.

What You'll Master

▶ Core ALM Foundations –

Develop hands-on expertise in:

- Structural Liquidity Statements (SLS)
- LCR & NSFR Computation
- IRRBB – NII & EVE Calculations
- Fund Transfer Pricing (FTP)

All modules are supported by real-world Excel models.

▶ Interest Rate & Liquidity Risk Mastery–

Understand and model:

- Traditional Gap Analysis
- Duration & EVE Calculations
- Repricing, Basis, and Yield Curve Risks
- Credit Spread Risk in the Banking Book

▶ Derivative Hedging Techniques–

Learn to hedge IRRBB and FX exposures using:

- Linear & Non-linear Derivatives
- Valuation Adjustments & Impact Analysis

▶ Performance & Profitability Analytics–

Integrate ALM with performance management using:

- RAROC frameworks
- FTP methods (Single Pool, Double Pool, Matched Maturity)
- FTP impact across product lines

▶ Behavioural Modelling of Retail Products –

Model dynamic balance sheet behavior with:

- **Prepayment & Default Models** using Cox, Logistic, and Linear Regression
- **Credit Card Behavior:** Revolvers, Transactors, Utilisation Trends
- **Fixed Deposit Renewals & Redemptions**
- **NMD Modelling:** Decay Analysis, Jarrow-Van Deventer Survival Models
- **Automatic Option Valuation for Callable Products**

▶ Regulatory Integration: ICAAP & ILAAP–

Build dynamic, scenario-based capital and liquidity management frameworks:

- **Pillar 1 RWA and Pillar 2 Risk Simulation**
- **Stress Testing & Scenario Design**
- **Management Action Plans & Dynamic Balance Sheet Modelling**

▶ Live Simulation Workshops–

Engage in experiential learning through:

- **CLEAR OPS: ICAAP | ILAAP | IRRBB Integration**
- **Economic Capital Modelling & Strategy**
- **ProBanker ALM Simulation Game**
- **Liability-Driven Investment (LDI) Scenarios**

100+ Hours | Excel + Python

Model ICAAP, IRRBB, LCR/NSFR, and behavioral risk to manage the banking book.



ICAAP

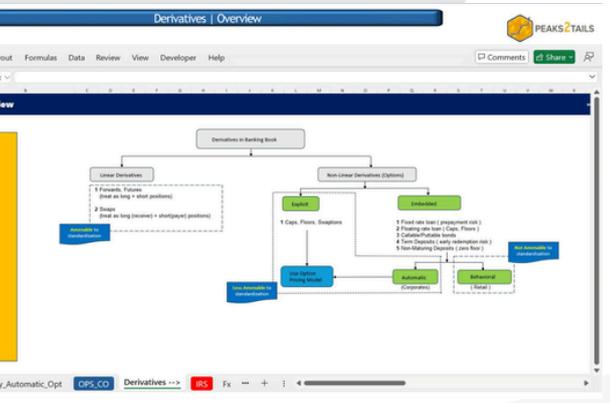
This section provides a detailed overview of the Internal Capital Adequacy Assessment Process, including:

- Capital Requirements:** Tables detailing required capital for different risk categories.
- Capital Resources:** Tables detailing available capital resources.
- Capital Shortfall:** Tables detailing any capital shortfalls and the required actions.
- Stress Testing:** Results of stress testing scenarios.

Automatic Options | Prepayment

This table provides a detailed breakdown of prepayment options, including:

- Option Type:** Call, Put, etc.
- Strike Price:** The price at which the option can be exercised.
- Expiration Date:** The date when the option expires.
- Current Price:** The current market price of the option.
- Delta:** The sensitivity of the option price to changes in the underlying asset price.



ILAAP

This section details the Internal Liquidity Adequacy Assessment Process, including:

- Simulation Results:** Results of liquidity stress tests.
- Balance Sheet:** Current balance sheet showing assets and liabilities.
- Capital Requirements:** Required capital for liquidity.
- Capital Resources:** Available capital resources.

Automatic Options | Redemption

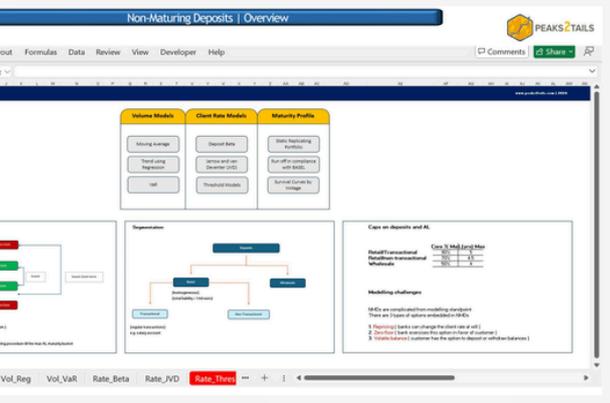
This table details redemption options, including:

- Option Type:** Call, Put, etc.
- Strike Price:** The price at which the option can be exercised.
- Expiration Date:** The date when the option expires.
- Current Price:** The current market price of the option.
- Delta:** The sensitivity of the option price to changes in the underlying asset price.

IRRBB

This section details Interest Rate Risk in the Banking Book, including:

- Simulation Results:** Results of interest rate stress tests.
- Balance Sheet:** Current balance sheet showing assets and liabilities.
- Capital Requirements:** Required capital for interest rate risk.
- Capital Resources:** Available capital resources.



5. Risk and AI (RAI)

155+ Hours | Excel + Python | The Fusion of Regulation, Risk & Intelligence

Artificial Intelligence is redefining risk—but only if it's responsible, explainable, and grounded in domain knowledge. **Peaks2Tails** delivers an advanced, holistic program that combines machine learning, mathematics, model governance, and regulatory use cases to prepare the next-gen Quant-Risk-AI leader.

What You'll Master

▶ Foundations of AI in Risk –

Start with the building blocks of machine intelligence applied to financial risk:

- Supervised, Unsupervised, Semi-supervised & Reinforcement Learning
- Model Estimation & Performance Evaluation
- Text Mining, NLP & Generative AI (GenAI)
- Fairness, Ethics & Responsible AI
- AI Model Governance & Regulation

▶ Real-World Risk-AI Use Cases–

Apply AI models to solve real financial challenges:

- PCA-based VaR for Fixed Income
- Macroeconomic Forecasting using kNN
- Derivative Pricing via Deep Learning
- Loan Default Prediction
- Anomaly Detection in Payment Systems
- Sentiment Analysis for Market Volatility
- LLMs for Regulatory Interpretation & Bias Detection
- PnL & VaR Forecasting, Liquidity Risk Modelling

▶ Quantitative & Math Foundations–

Master the mathematics that power AI:

- Multivariable Calculus, Optimization, Vector & Matrix Algebra
- Python-based Linear Algebra using NumPy & SciPy
- Applied Differentiation, Integration & 3D Geometry for Risk Modelling

▶ Live Workshops & Labs–

Participate in live labs on:

- Prompt Engineering
- GenAI in Regulatory Use
- Text & Modern Learning Techniques
- Bias Detection and Explainability for AI Models

Bonus Learning Paths

- Math Primer (Functions, Calculus, Linear Algebra)
- Python Applications of Algorithms
- Intensive Q&A + Problem Solving through self-paced & live support

Why RAI Matters:

As regulators and institutions demand explainable, auditable AI, the RAI program positions you at the intersection of **ethics, efficacy, and execution**—a rare skillset in today's risk landscape. It bridges the gap between data science and domain knowledge, enabling responsible innovation in financial services. From fraud detection to regulatory interpretation, RAI empowers professionals to deploy AI where it matters most.

PROBABILITY DISTRIBUTION

Binomial vs Poisson

$\lambda = 5$
 $n = 500$
 $p = 0.01$

Bivariate Normal

Joint Distribution

y	x=1	x=2	x=3
1	0.1	0.1	0.05
2	0.15	0.1	0.05
3	0.2	0.05	0
4	0.15	0.05	0

$P(X=2, Y=2) = 0.1$

LINEAR DISCRIMINANT ANALYSIS

Covariance Matrices

	x0	x1	σ_{poisson}
μ_0	12.30	-1.44	16.57
μ_1	-1.44	23.76	0.073333
$\mu_0 \cdot \mu_1$	28.87	-1.37	18.65

Means

	μ_0	μ_1	$\mu_0 \cdot \mu_1$
μ_0'	27.37	24.6	2.77
μ_1'	44.20	30.77	13.43

Projected Means

	μ_0'	μ_1'
C	50.72	37.12
C	43.924	

Analytical Solution gives the direction of w as

$W = \alpha z^T (\mu_0 - \mu_1)$

$W = \begin{bmatrix} 0.11099 \\ 0.32036 \end{bmatrix}$

$w = \begin{bmatrix} 0.3274 \\ 0.9449 \end{bmatrix}$

$\sigma^2_{\text{between}} = (\mu_0' - \mu_1')^2 = 184.93$

$\sigma^2_{\text{within}} = w^T w = 40.1098$

Maximize $\frac{\sigma^2_{\text{between}}}{\sigma^2_{\text{within}}} = 4.611$

The Analytical result can be derived using Excel Solver as well

$W = \begin{bmatrix} 0.11093 \\ 0.46207 \end{bmatrix}$

$w = \begin{bmatrix} 0.3274 \\ 0.9449 \end{bmatrix}$

Projected Means

	μ_0'	μ_1'
	50.72	37.12

Class Default (y = 1)

	μ	σ
	24.6	30.77
	4.071	4.32

Class No Default (y = 0)

	μ	σ
	27.37	44.20
	3.51	4.87

Projection of Class 1 on w

	μ	σ
	36.93	4.35

Projection of Class 0 on w

	μ	σ
	46.22	3.75

w density (y=1) density (y=0)

w	density (y=1)	density (y=0)
0	5.6339E-19	1.110E-34
2	3.6669E-17	6.986E-32

Risk & AI Regression

Linear Regression – 6 ways to determine coefficients

Method 1 - Slope and Intercept

Method 2 - Matrix Method $\hat{\beta} = (X^T X)^{-1} X^T Y$

Method 3 - Excel Data Tools

Method 4 - LINST

Method 5 - Minimize SSR

Method 6 - Maximum Likelihood Estimator

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Risk & AI Time Series

Time Series – AR model

Forecasting AR(1) process

Estimated $\hat{\mu} = \frac{\phi_0}{1 - \phi_1}$

$\phi_1^2 = \frac{\sigma^2}{1 - \phi_1^2}$

$\sigma^2(1 + \phi_1^2 + \phi_1^4 + \dots + \phi_1^{2(n-1)}) = \sigma^2 \frac{1 - \phi_1^{2n}}{1 - \phi_1^2}$

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Risk & AI Supervised Learning

LSTM

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Risk & AI Supervised Learning

Linear Discriminant Analysis

Class 0 = $X_0(x, y_0)$

Class 1 = $X_1(x, y_1)$

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Risk & AI Regression

Linear Regression

OLS Regression Results

Model: OLS Adj. R-squared: 0.723

Method: Least Squares F-statistic: 3227.

Date: Sat, 14 Jan 2023 Prob (F-statistic): 0.00

Time: 17:59:06 Log-Likelihood: -1793.5

No. Observations: 1237 AIC: 3591.

Df Residuals: 1235 BIC: 3601.

Df Model: 1

Covariance Type: nonrobust

coef std err t P>|t| [0.025 0.975]

const 0.0370 0.029 1.261 0.208 -0.021 0.095

Ro + v 1.1932 0.021 56.800 0.000 1.140 1.222

Omnibus: 109.415 Durbin-Watson: 2.000

Prob(Omnibus): 0.000 Jarque-Bera (JB): 671.145

Skew: -0.006 Prob(SJB): 1.83e-146

Kurtosis: 6.609 Cond. No. 1.41

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Risk & AI Supervised Learning

Tree Based Models

(Classification)

(Regression)

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Risk & AI Statistical Learning

Bayesian Estimator – Metropolis Hastings

Metropolis-Hastings Sampling

Let's use a Normal prior for $\mu = N(\mu_0, \sigma_0^2)$ and continue using a flat prior for σ^2 . Note: since we have only 10 data points, the posterior for σ^2 will be affected by the prior. Posterior is Unimodal & Unimodal & Unimodal

Let's assume $\mu = 0$ and $\sigma^2 = 1$. Let's also assume a proposal density $q(\mu, \sigma^2)$

We choose two small ϵ , a mix of the proposal will be accepted and the chain will move slowly. If we choose a large ϵ , most proposals will be rejected. In Metropolis Hastings, we draw the Trace plots and calculate the acceptance rate to tune our priors and proposal distributions.

Trace - μ

Trace - σ^2

Metropolis-Hastings Sampling

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Risk & AI Supervised Learning

Artificial Neural Network – Iris flower data set

Let's follow the vectorized form to handle the weights in a compact form

$W = (W^0 \parallel W^1 \parallel W^2)$ is the weights on the i th and j th in the bias

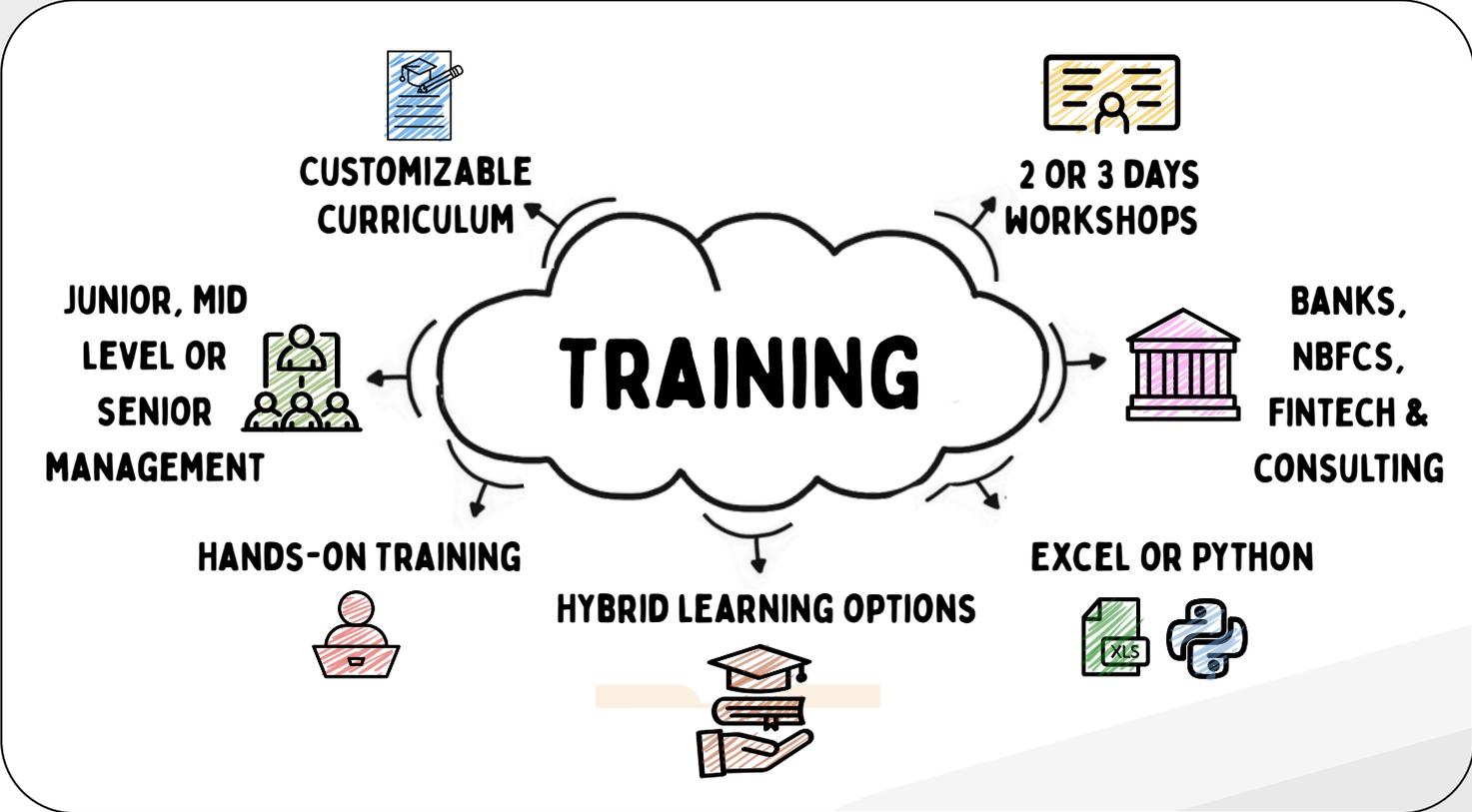
$W^0 = (W^0_0 \parallel \dots \parallel W^0_{n-1})$ All the weights for the i th cell in the bias.

$W^1 = (W^1_0 \parallel \dots \parallel W^1_{n-1})$ All the weights for the i th cell in the bias.

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CORPORATE TRAINING PROGRAMS

Tailored Learning, Transformative Result



SYLLABUS AT A GLANCE

Peaks2Tails

Credit Risk

- | | |
|------------------------------------|-------------------------------------|
| 1 Basic Understanding | 12 Actuarial Credit Risk Models |
| 2 Scorecards | 13 APC Extensions |
| 3 Loss Modelling | 13 IFRS 9 LGD & EAD Calculation |
| 4 Modelling Probability of Default | 15 IFRS 9 Staging criteria |
| 5 Modelling Loss given Default | 16 Wholesale Models |
| 6 Modelling Exposure at Default | 17 Low Default Portfolios |
| 7 Cure Modelling | 18 Stress Testing |
| 8 Basel Capital Charge | 19 Model Validation |
| 9 IFRS 9 Introduction | 20 Pricing Loans |
| 10 IFRS 9 PD Calculation | 21 Corporate Credit Models |
| 11 CECL techniques | 22 Machine Learning for credit risk |

Deep Quant Finance

PRIMER

- Math Primer
- Python Primer
- Stochastic Calculus
- Markov Models

PORTFOLIO MANAGEMENT

- Mean Variance Optimization
- CAPM & Factor Models
- Black-Litterman model
- Active Portfolio Management

EQUITY DERIVATIVES

- Binomial Tree Model
- Black-Scholes Equation
- Finite Difference Methods
- Local Volatility Models
- Jump Process
- COS method - European Option Valuation

- Robust Optimization
- Stochastic control
- Statistical Arbitrage (Pairs trading)
- Advanced Sensitivity Computation

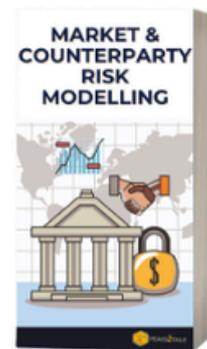
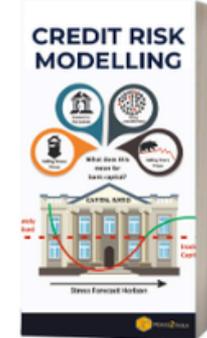
INTEREST RATE & FX DERIVATIVES

- Short rate models
- Interest rate and FX derivatives
- RFR - the new regime

CREDIT DERIVATIVES AI IN RISK & FINANCE

- Monte Carlo Simulation

CURRICULUM



Market Risk

PRIMER

- Python Basics
- Python Advanced Modules
- Risk Foundation
- Additional Primers

FRTB CAPITAL CHARGE

- Capital Charge for Equity Class
- Capital Charge for Rates
- Capital Charge for FX & Commodity
- Internal Models Method

DERIVATIVE VALUATION

- Stochastic Processes and Applications

- Interest Rate Derivatives
- Term Structure Models
- FX Derivatives
- Hedging
- Advanced Sensitivities

COUNTERPARTY CREDIT RISK (CCR)

- Exposure Basics
- CCR and Regulatory Capital Charge
- xVA and Regulatory Capital Charge
- Model Validation

ICAAP, Basel, Liquidity risk

- Key ALM concepts
- Funding Risks
- Interest Rate Risk
- Behavioural Modelling

- ICAAP & ILAAP
- Derivatives
- Risk & Performance management
- Fund Transfer Pricing

SCR

- Physical Risk Modelling (excel)
- Transition Risk Modelling (excel)
- Scope 1,2,3 (excel)
- Pillar 2 Physical Risk (excel)
- Pillar 2 Transition Risk (excel)
- Scenario analysis (excel)

- BRSR Reporting (template)
- Climate Risk Policy (template)
- Account Level Stress Testing (excel)
- Stress testing for Corporate portfolio
- Transition Planning (excel)
- Climate Risk for Liquidity & Mkt risk

Risk & AI

- Supervised Learning
- Unsupervised Learning
- Deep Learning

- Reinforcement Learning
- Text mining
- GenAI

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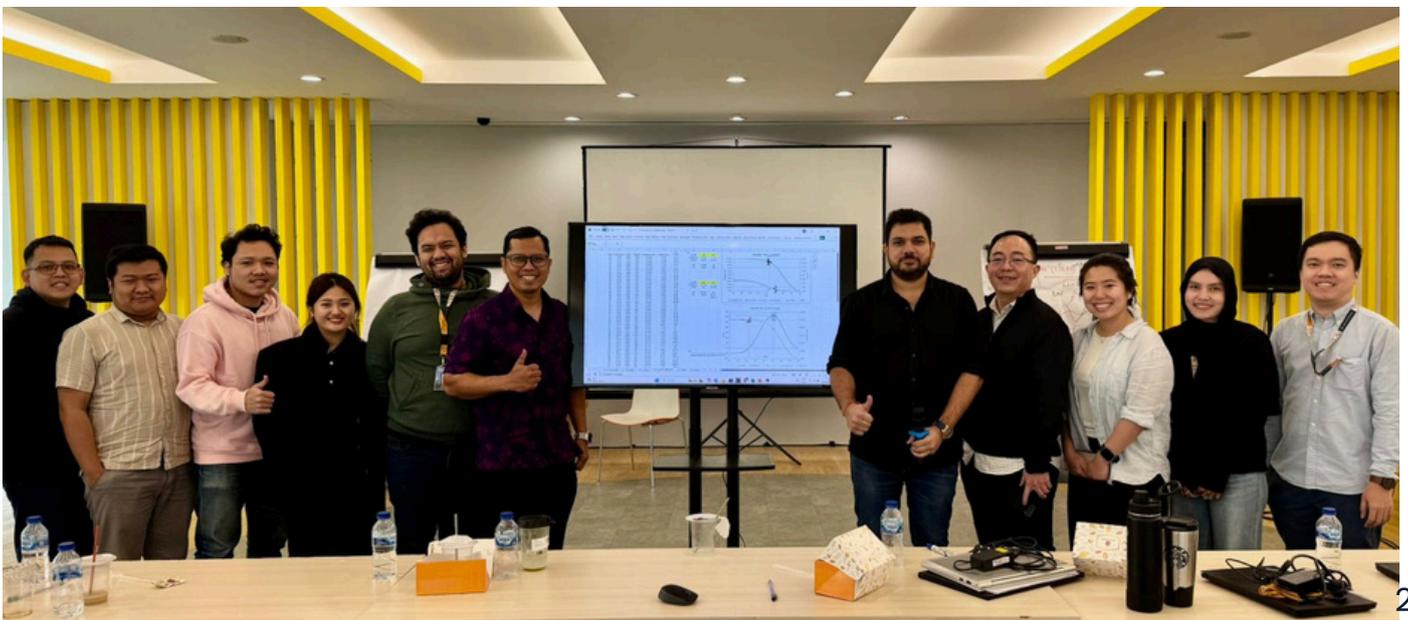
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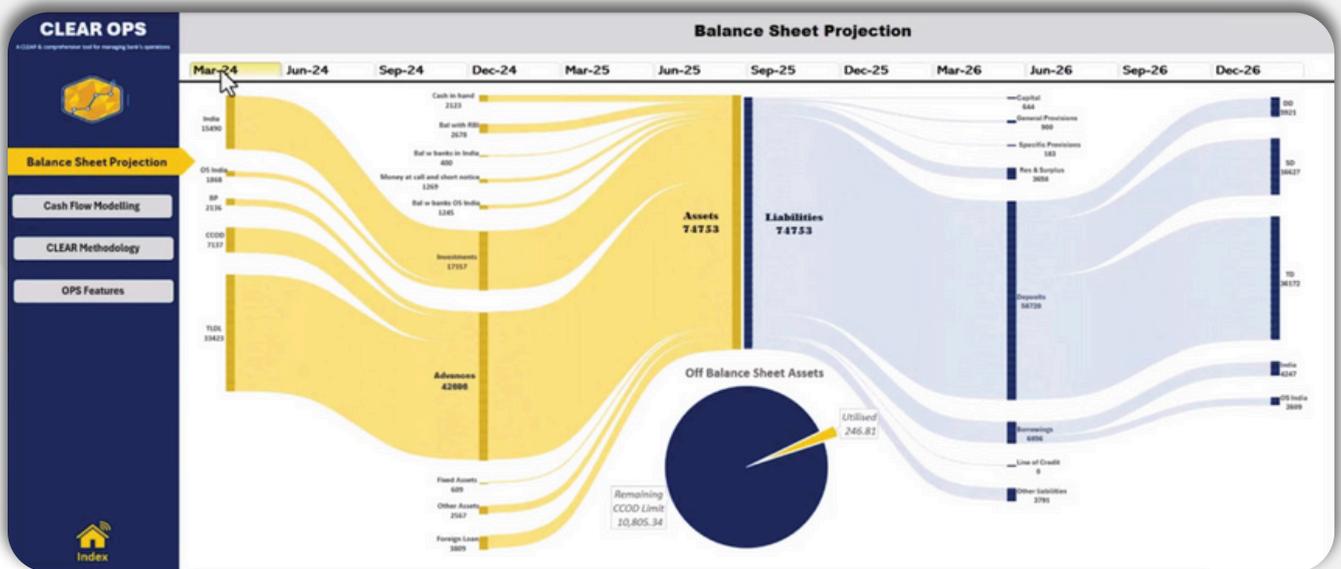
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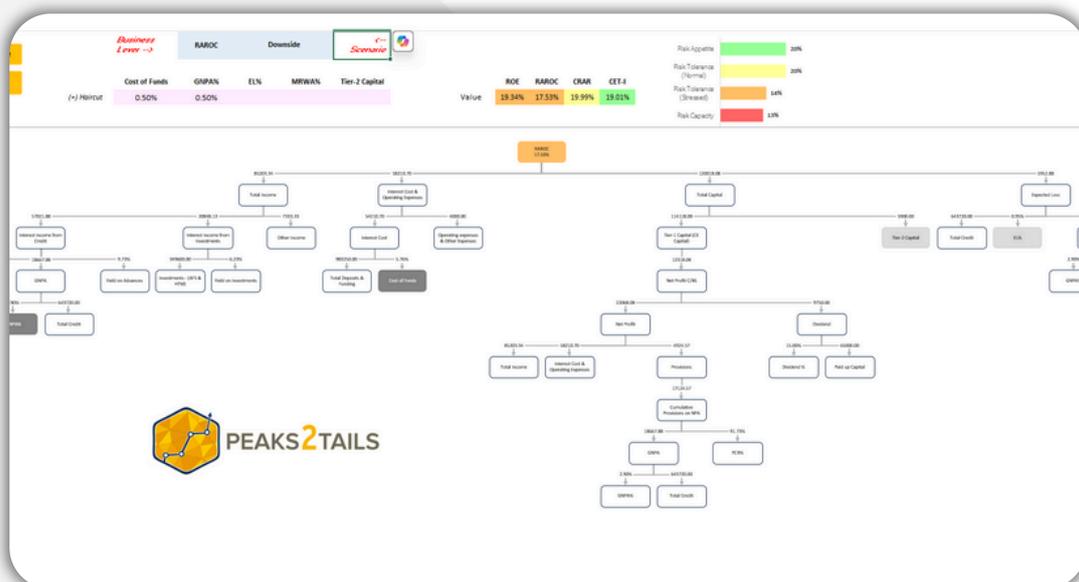
CLEAR OPS

Integrated tool for ICAAP, ILAAP & IRRBB Modelling



RISK RAINBOW

Visual framework to define Risk Appetite, Tolerance & Capacity



CREDIT SPARK

Comprehensive Loan Pricing engine for dynamic lending strategies

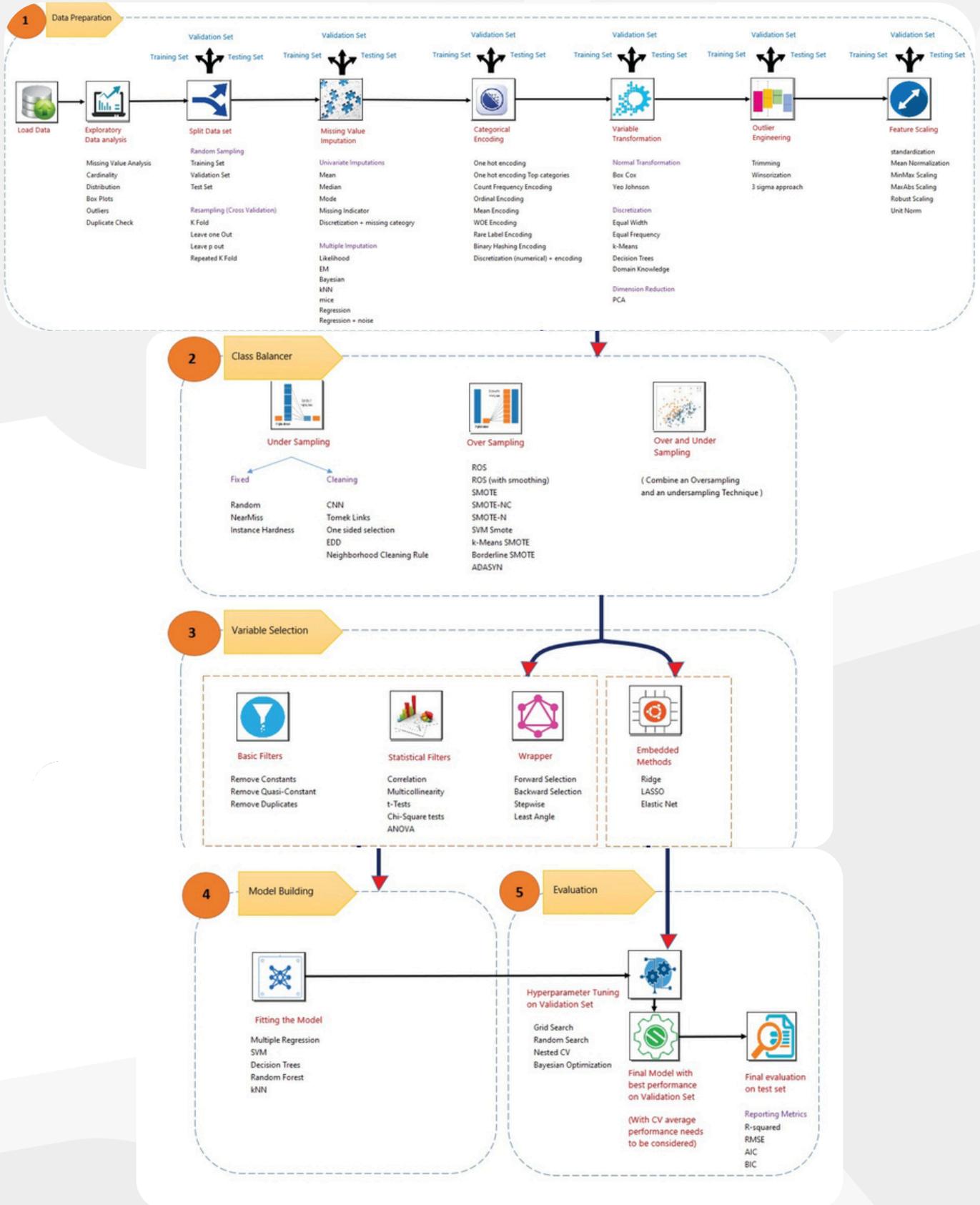


ECL SMART

Full-suite IFRS 9/CECL solution for ECL Model Development, Validation & Audit



MENTOS & CHAMPS



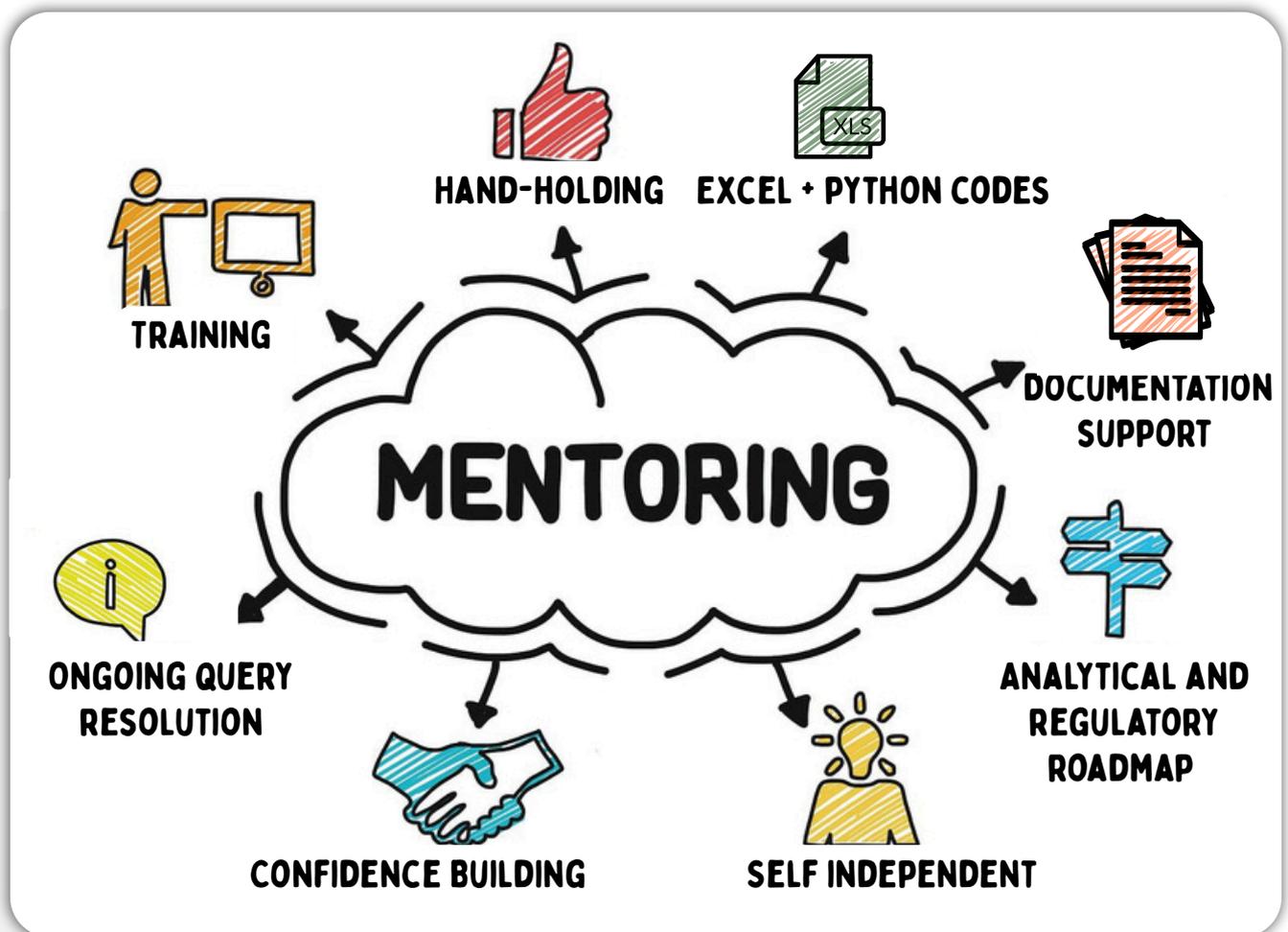
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Whether it's building retail scorecards, designing ICAAP frameworks, or deploying advanced machine learning in credit risk, our engagements go beyond instruction—toward **real transformation**.



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From early-career analysts to senior risk officers, Peaks2Tails has trained over 5000 professionals across Asia in areas such as credit risk modelling, IFRS 9, quantitative analytics, Python, and AI in finance. Our participants come from leading banks, fintechs, consulting firms, and regulatory bodies—equipped with skills that are immediately applicable and future-ready.

WHERE OUR ALUMNI WORK

Top Banks, Global Consultancies, Leading Fintechs.



TESTIMONIALS



CERTIFICATE OF APPRECIATION

This is to certify that **Mr. Karan Aggarwal** from M/s PEAKS2TAILS LLP has successfully conducted a highly insightful and engaging training program on **Credit Risk Modelling** with **hands-on exercises** for our team.

The training program was instrumental in enhancing the knowledge and skills of our team members in the areas of credit risk management. Mr. Karan Aggarwal demonstrated outstanding expertise and professionalism throughout the sessions, providing valuable practical insights and fostering a collaborative learning environment.

We extend our sincere appreciation to him for his contribution towards improving participants understanding of complex credit risk topics and enhancing our internal capabilities in managing and modelling expected credit losses.

We highly recommend Mr. Karan Agarwal and his team at M/s Peaks2Tail for their professionalism, knowledge, and dedication in delivering high-quality training sessions.

Date: 06.03.2025

Location: Mumbai

Ashwini Kumar Choudhary
(Chief Risk Officer)

AWARDS- BEST CREDIT RISK TRAINING & DEVELOPMENT + LIQUIDITY RISK SOLUTION





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