POLITECNICO
MILANO 1863

Advanced CRM Analytics & Survival Analysis

Open challenges in advanced CRM

- **Predictive Analytics**: forecasting customer behavior (e.g., churn, upselling or cross-selling) → regression, machine learning models, and time-series forecasting
- **Prescriptive Analytics**: suggesting actions potentially linked to a positive outcome (e.g., NBO/NBM, caring, suggested communication strategies, etc.) → Optimization and simulation algorithms, maybe inspired by MBA or similar
- **Customer Segmentation**: including demographic information, purchase behavior, engagement, etc. → K-means or hierarchical clustering, latent class analysis etc.
- **Sentiment Analysis**: understanding customer sentiments, opinions, and attitudes expressed (e.g., in social media or even in customer service channels) → NLP and text analysis

Open challenges in advanced CRM

- **Social Network Analysis**: analyzing social relationships to identify hot spots in the network, communities, and its dynamics → network analysis
- **Web and E-commerce Analytics**: Continuous journey and conversion improvement moving from KPIs and analytics → clickstream analysis, conversion rate optimization, systematic A/B testing
- **Churn Analysis**: identifying levers and tools to explain/predict/prevent customer abandonment → machine learning, logistic regression, random forest, genetic models, survival analysis
- **Lifetime Value Analysis**: CLV modelling → bayesian models

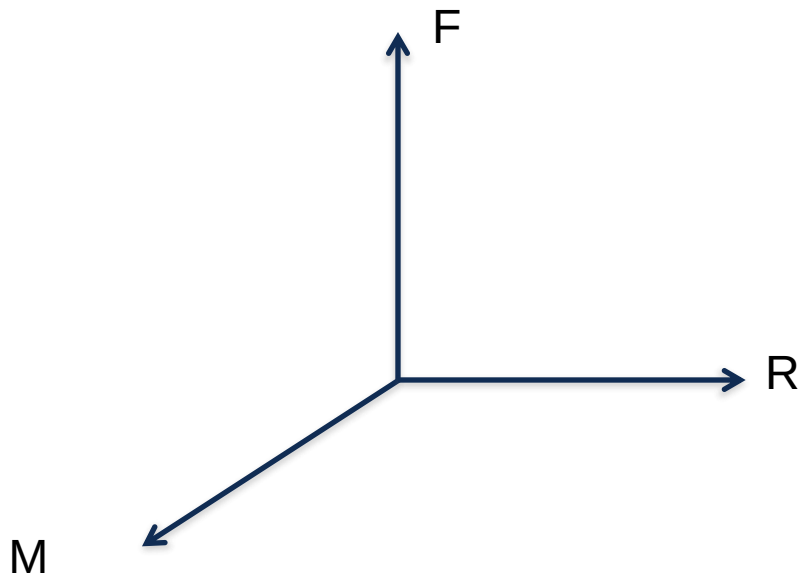
A recap

Customer assessment: RFM Analysis

Recency – How recently has the customer bought?

Frequency – How often does the customer buy?

Monetary – How much does the customer spend?



Concurrent models

LRFM (Chang & Tsay, 2004) → introduces the concept of Length (the duration of a customer's relationship with a company)

RFMTC (Yeh et al. 2009) → Time since first purchase (T) and Churn probability (C)

GRFM (Chang & Tsay, 2004) → including category information

LRFMP (Moslehi et al., 2014) → LRMF + periodicity

Reg-FM

Bi-dimensional regularity (Monetary – average ticket, and interpurchase time)

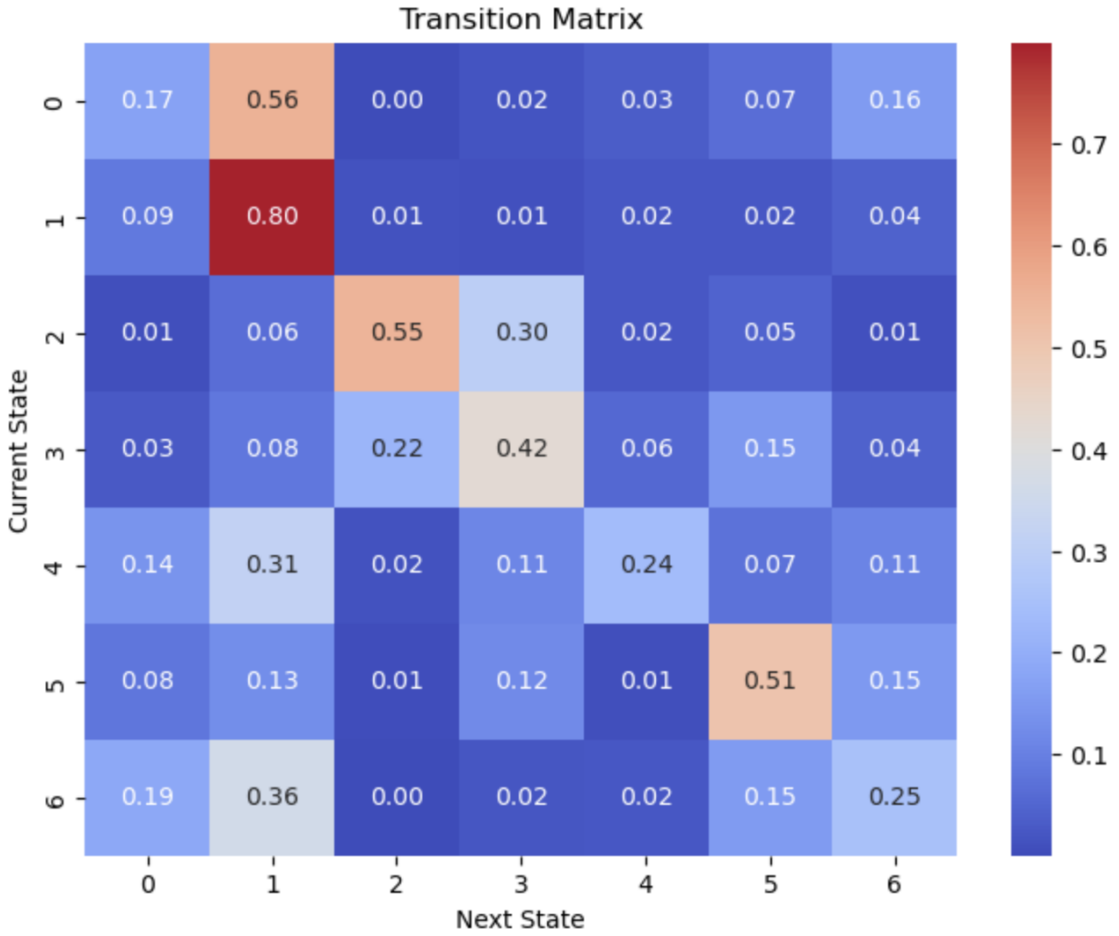
Noticeable B2B implications (and not only)

HMM and Churn analysis in non-contractual settings

Mean values of variables per updated hidden state:

Hidden_State_7	Recency	Frequency	Monetary	std_monetary	Periodicity
0	617.978186	0.000000	0.000000	0.000000	617.978186
1	43.126784	1.000000	28.863699	0.000000	0.000000
2	30.715476	2.633503	55.646019	10.508504	30.804742
3	13.741946	6.539704	118.976631	9.073105	14.848410
4	24.547911	4.547042	254.466478	35.486270	67.602296
5	7.025833	14.152520	396.026822	17.750385	9.625539
6	1.663060	27.529331	685.567960	15.738170	2.966613

Cluster 0: Inactive / Lost
Cluster 1: One time Customers
Cluster 2: Infrequent Customers
Cluster 3: Regular Customers
Cluster 4: Irregular Customers
Cluster 5: Less regular high value Customers
Cluster 6: High-value Customers



HMM and Churn analysis in non-contractual settings

Mean values of variables per updated hidden state:

Hidden_State_8	Recency	Frequency	Monetary	std_monetary	Periodicity
0	652.417959	0.000000	0.000000	0.000000	652.417959
1	63.485337	0.699903	13.710425	0.067865	35.985625
2	66.394319	0.937203	19.961609	1.334041	49.751521
3	27.686550	2.995358	95.658040	15.058335	42.503853
4	23.501588	6.547730	127.156468	10.478999	20.720312
5	9.134775	7.941962	168.600772	11.164939	12.669160
6	2.517529	22.970185	480.766322	12.586053	3.699699
7	8.147459	20.557338	791.994209	30.969412	11.567330

Hidden_State_8	monetary_difference
0	-1.336389
1	-24.006910
2	-329.141880
3	56.966149
4	-92.004354
5	62.742327
6	136.431549
7	155.198193

Cluster 0: Inactive / Lost
Cluster 1: Soft Churners
Cluster 2: Hard Churners
Cluster 3: Irregular Customers
Cluster 4: Declining Customers
Cluster 5: Normal Customers
Cluster 6: High-value Customers
Cluster 7: Champions Customers