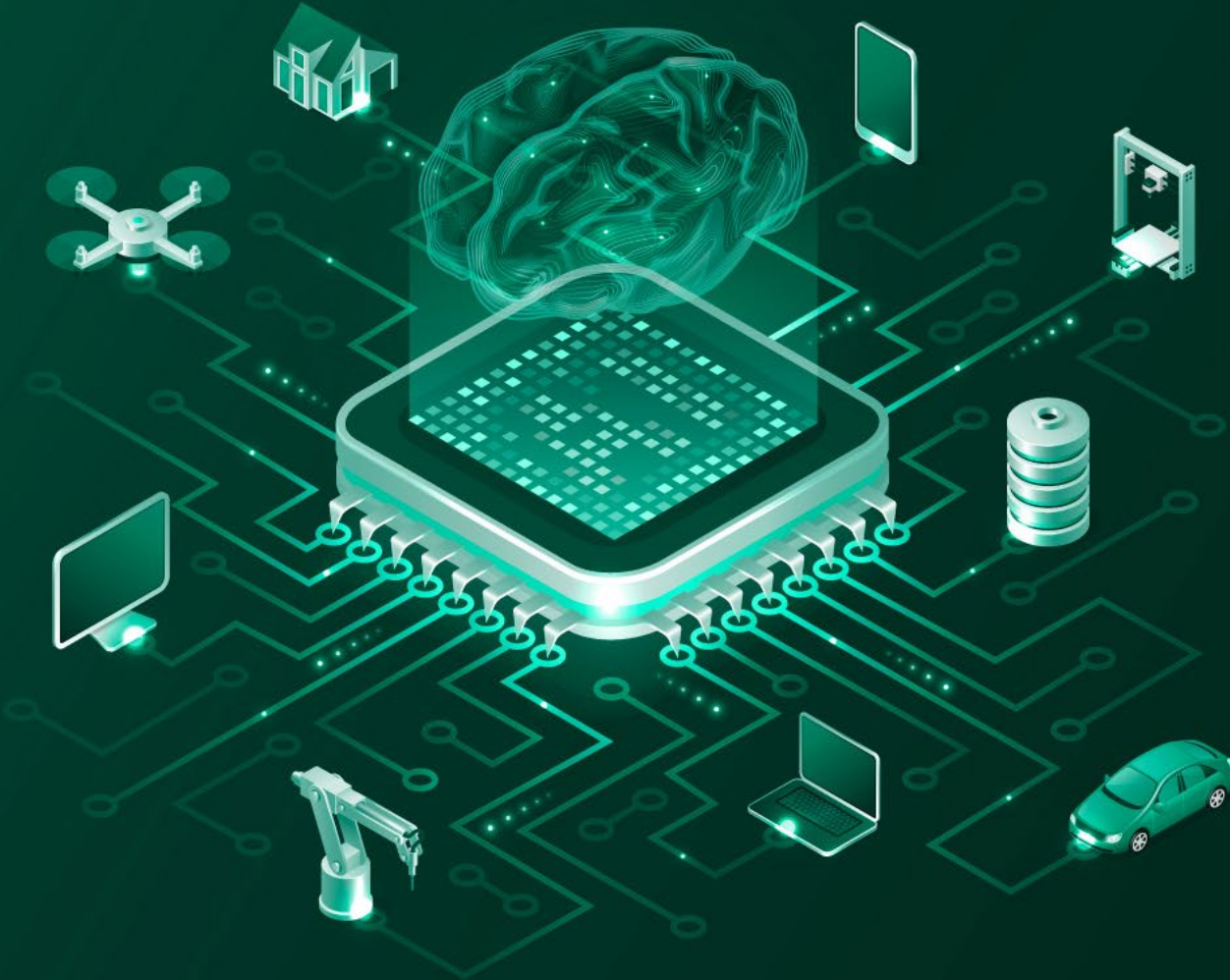


UMNAI



SIMPLY **BETTER** DECISIONS

INTRODUCING
HYBRID INTELLIGENCE

*“Rather than trying to explain Black boxes,
build models that are interpretable”*

Cynthia Rudin

HYBRID INTELLIGENCE

- Hybrid Intelligence
- Some Use Case examples
- Collaboration
- Q&A

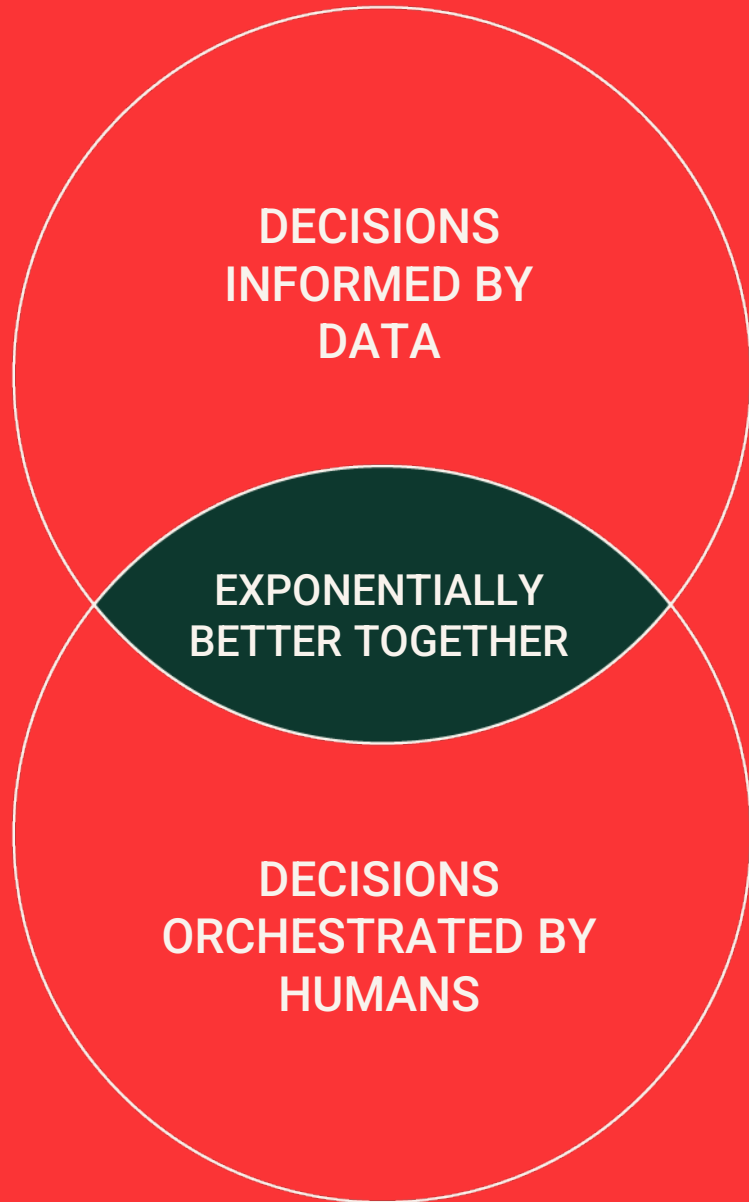
YOU SHOULDN'T HAVE TO CHOOSE

ARTIFICIAL INTELLIGENCE



HUMAN INTELLIGENCE





HYBRID INTELLIGENCE

The hallmark of a truly disruptive technology is the simplicity with which it solves problems and how quickly it lays bare the fundamental inadequacies of what it replaces

TIMELINES

Dec 2018 – first theoretical breakthroughs

2019 – initial implementation and validation of theory

2019/20 – IP development and protection, initial productisation attempts

2021 – First MVP build, benchmarking and further validation inc. a pivot or two

2022 – Final shippable MVP

WHAT IS IT?

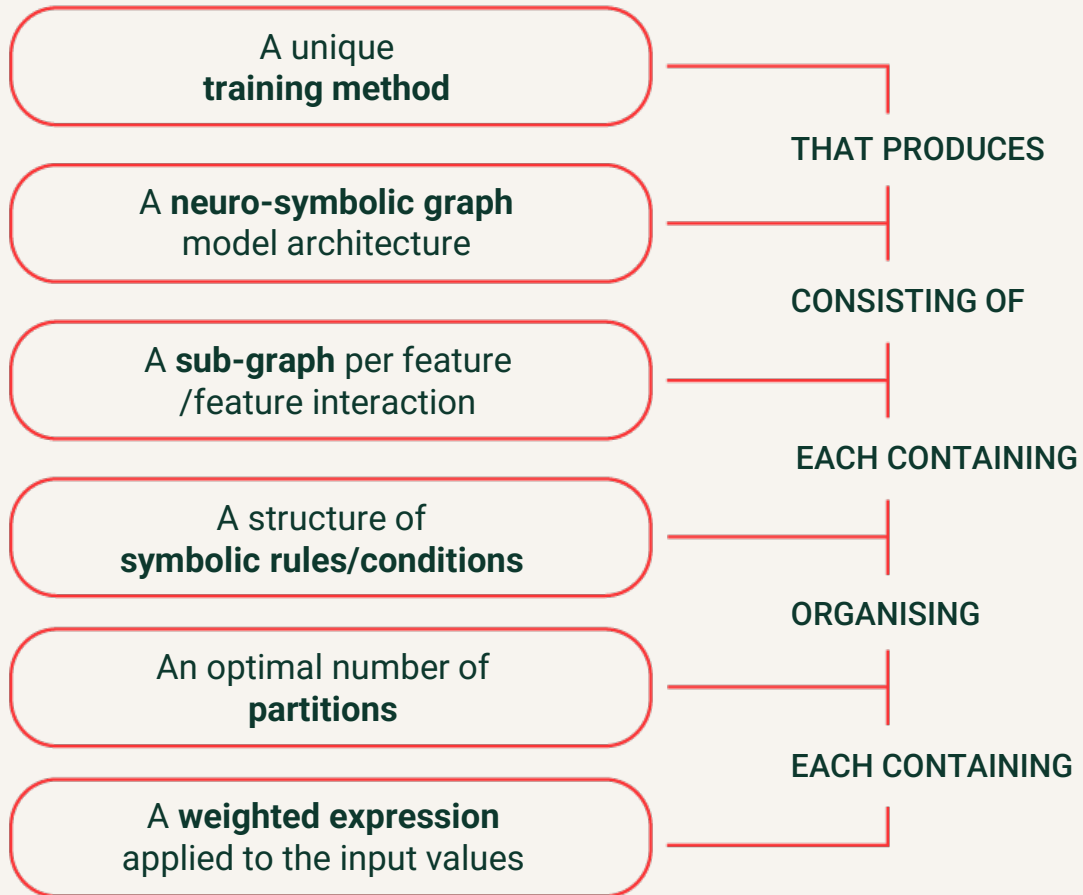
- new, novel, proprietary, licensable technology.
- enabling technology, consisting of:
 - model Induction (training) library
 - novel model architecture and model inference library
 - development framework and toolkits
- productised to be a “drop-in” alternative to common current tools and techniques
- as predictively performant as best-in-class current modelling techniques in most use-cases
- agnostic

powered by UMNAI

HYBRID INTELLIGENCE

INDUCTION

TRAINING AND MODELS



- ✓ Increasing similar behaviour within partitions
- ✓ Maximising dissimilarity between partitions
- ✓ Minimising complexity
- ✓ Preference for smaller over larger models
- ✓ Preference for wide over deep

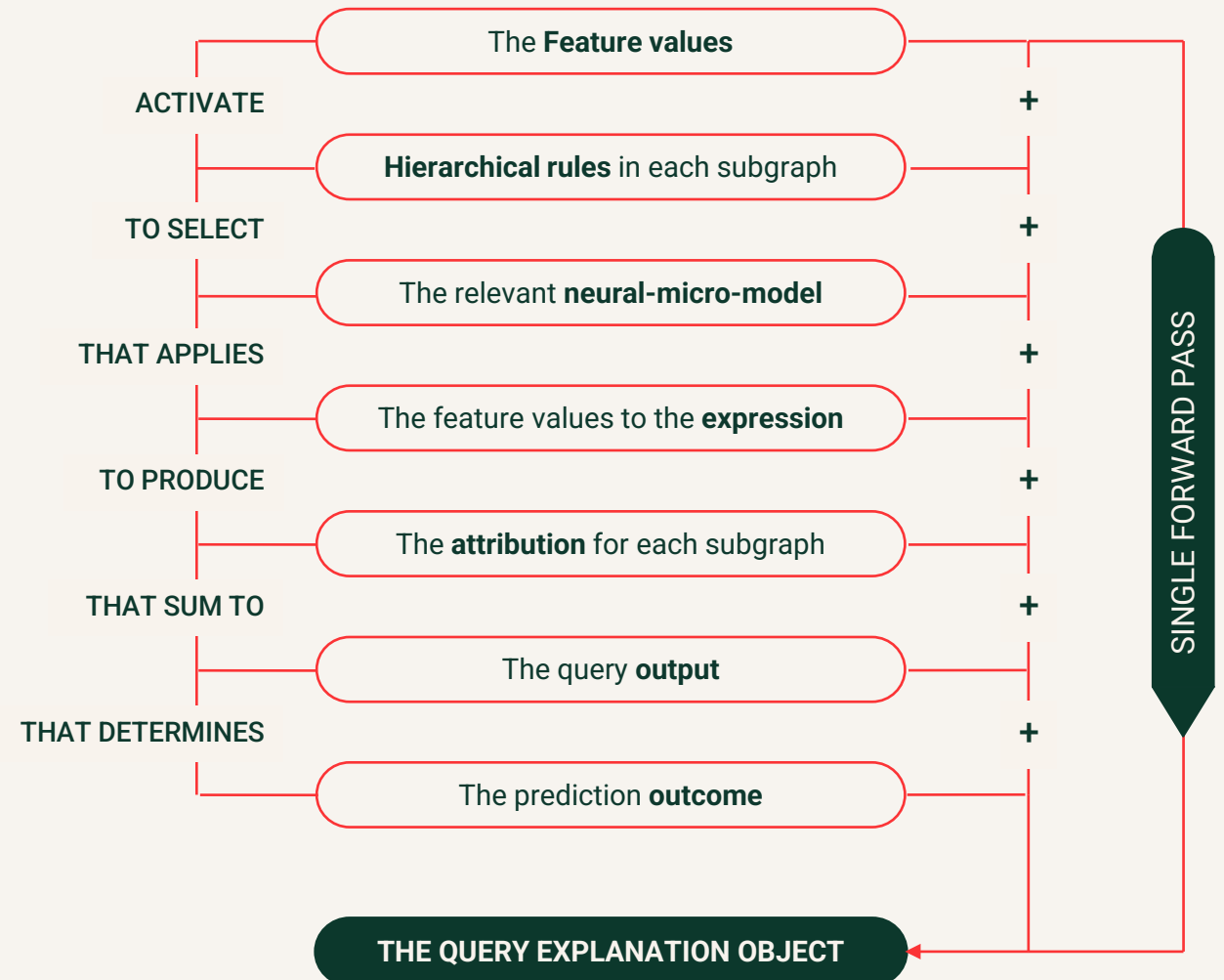
powered by UMNAI

HYBRID INTELLIGENCE

Local Explanation Object the foundation of empowerment

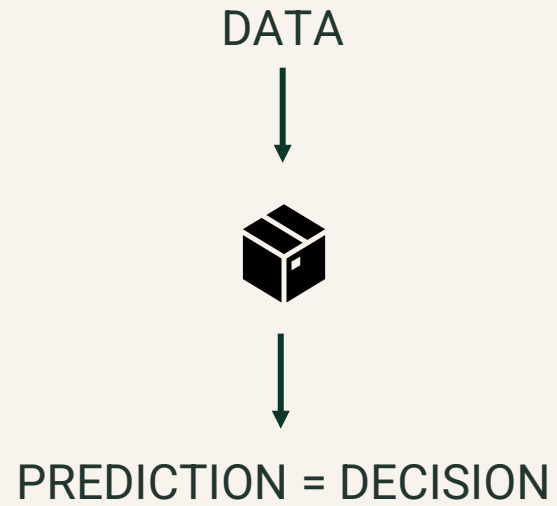
- Realtime
- Guaranteed to be correct
- Complete
- Fully decomposed
- Programmatically Consumable
- No additional processing

HOW A LOCAL EXPLANATION OBJECT IS BUILT



AN EXTRACT

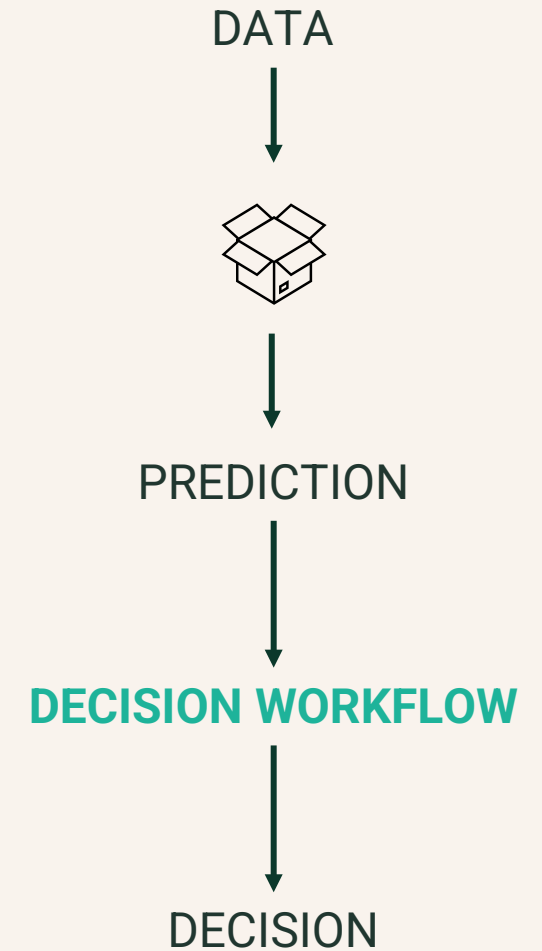
RANK	TOTAL		% CONTRIBUTION		FEATURE					FEATURE					ACTIVATION	
	Attribution	Value	Module	Partition	Feature	Input	Bin Low	Bin High	Attribution	Feature	Input	Bin Low	Bin High	Attribution	Module	Partition
1	0.34473	5.675%	Education	Masters	Education	Masters			0.132569	Occupation	Managerial			0.03190	54	4
2	-0.122653	4.232%	Gender	Female	Gender	Female			-0.081230	MaritalStatus	Divorced			-0.04142	69	0
3	0.091327	3.151%	EducationYrs	14	EducationYrs	14	13.5	15.00	0.045510	Race	White			0.04582	64	6
4	-0.084489	2.915%	Race	White	Race	White			-0.042244	Relationship	Unmarried			-0.04224	96	3
5	0.069460	2.397%	Age	43	Age	43	42.5	43.50	0.034457	Gender	Female			0.03500	18	50
6	-0.065308	2.251%	MaritalStatus	Divorced	MaritalStatus	Divorced			-0.034191	Race	White			-0.03112	85	0
7	-0.062954	2.172%	CapitalGain	0	CapitalGain	0		7,073.50	-0.021263	Education	Masters			-0.01926	102	0
8	0.041614	2.128%	Age	43	Age	43	29.5		0.030695	Education	Masters			0.03008	16	11
9	-0.037193	1.980%	MaritalStatus	Divorced	MaritalStatus	Divorced			-0.021984	Relationship	Unmarried			-0.02941	86	0
10	-0.056506	1.950%	Gender	Female	Gender	Female			-0.028933	Relationship	Unmarried			-0.02757	73	0
11	-0.054822	1.892%	MaritalStatus	Divorced	MaritalStatus	Divorced			-0.031486	WorkClass	Selfempnotinc			-0.02334	87	0
12	-0.053502	1.846%	HoursPerWeek	45	HoursPerWeek	45	41.5		0.021245	Occupation	Execmanagerial			0.04116	78	2
13	-0.052726	1.812%	CapitalLoss	0	CapitalLoss	0			-0.020297	MaritalStatus	Divorced			-0.02670	42	0
14	-0.051762	1.786%	Education	Masters	Education	Masters			-0.022782	MaritalStatus	Divorced			-0.03898	52	0
15	-0.051227	1.768%	MaritalStatus	Divorced	MaritalStatus	Divorced			-0.051227						7	0
16	-0.049790	1.718%	Age	43	Age	43	38.5	46.50	-0.024727	MaritalStatus	Divorced			-0.02506	20	5
17	0.049447	1.700%	HoursPerWeek	45	HoursPerWeek	45	43.5		0.024624	Relationship	Unmarried			0.02482	80	5
18	0.048118	1.661%	NativeCountry	UnitedStates	NativeCountry	UnitedStates			0.025282	Occupation	Execmanagerial			0.02286	89	3
19	0.047822	1.650%	CapitalGain	0	CapitalGain	0		457.00	0.023632	Education	Masters			0.02419	28	5
20	0.047618	1.643%	EducationNum	14	EducationNum	14	12.5		0.023811	frwgt	292.175.00			0.02381	67	5
21	-0.046361	1.600%	frwgt	292175	frwgt	292175	275969	#####	-0.046361						13	8
22	-0.046279	1.597%	MaritalStatus	Divorced	MaritalStatus	Divorced			-0.023886	frwgt	292.175.00			-0.02239	88	0
23	-0.045163	1.558%	NativeCountry	UnitedStates	NativeCountry	UnitedStates			-0.046199	NativeCountry	UnitedStates			0.001004	83	0
24	0.044728	1.543%	CapitalGain	0	CapitalGain	0		5,119.00	0.022296	EducationNum	14.00	13.5		0.02243	29	16
25	-0.044471	1.514%	CapitalLoss	0	CapitalLoss	0		1,119.00	-0.033176	WorkClass	Selfempnotinc			-0.02112	37	1
26	-0.044060	1.510%	CapitalGain	0	CapitalGain	0		2,337.50	-0.031315	MaritalStatus	Divorced			-0.02273	32	0
27	0.043328	1.495%	HoursPerWeek	45	HoursPerWeek	45	43.5		0.021302	MaritalStatus	Divorced			0.02203	76	3
28	-0.043121	1.488%	CapitalGain	0	CapitalGain	0		7,073.50	-0.027177	Occupation	Execmanagerial			-0.02755	105	0
29	0.043124	1.460%	Occupation	Execmanagerial	Occupation	Execmanagerial			0.043124						9	0
30	-0.039117	1.351%	CapitalLoss	0	CapitalLoss	0		1,820.50	-0.038341	WorkClass	Selfempnotinc			-0.02078	47	0
31	-0.037977	1.310%	Gender	Female	Gender	Female			-0.038963	frwgt	292.175.00	192285		-0.01901	75	8
32	0.037861	1.306%	Occupation	Execmanagerial	Occupation	Execmanagerial			0.037861	Race	White			0.031935	92	0
33	-0.037592	1.297%	CapitalGain	0	CapitalGain	0			-0.020212	Relationship	Unmarried			-0.02788	36	0
34	-0.037430	1.291%	CapitalLoss	0	CapitalLoss	0			-0.035560	Occupation	Execmanagerial			0.05399	45	0
35	0.037315	1.287%	CapitalGain	0	CapitalGain	0		5,119.00	0.018467	Occupation	Execmanagerial			0.01885	34	4
36	-0.037219	1.284%														
37	0.036714	1.269%														
38	0.034516	1.192%														
39	-0.034343	1.185%														
40	-0.033291	1.149%														
41	-0.032943	1.117%														
42	-0.032013	1.109%														
43	-0.031804	1.097%														
44	-0.030997	1.056%														
45	-0.030707	1.039%														
46	-0.029818	0.988%														
47	-0.028089	0.969%														
48	-0.027980	0.963%														
49	-0.026366	0.910%														
50	-0.026003	0.892%														
51	-0.022881	0.789%														
52	-0.021853	0.754%														
53	-0.020570	0.720%														
54	-0.021858	0.692%														
55	-0.018544	0.640%														
56	0.018049	0.623%														
57	0.016666	0.577%														
58	-0.016130	0.570%														
59	-0.015487	0.569%	CapitalLoss	0	CapitalLoss	0		1,568.50	-0.008283	HoursPerWeek	45.00	41.5		0.00820	42	14
60	-0.016278	0.562%	HoursPerWeek	45	HoursPerWeek	45	41.5	49.50	-0.007986	Race	White			0.00839	79	8
61	-0.015096	0.512%	Age	43	Age	43	40.5	45.50	-0.007903	EducationNum	14.00	13.5		0.007719	17	76
62	-0.013415	0.463%	Relationship	Unmarried	Relationship	Unmarried			-0.007469	WorkClass	Selfempnotinc			0.02731	88	0
63	-0.013404	0.462%	EducationNum	14	EducationNum	14	12.5		0.006700	Gender	Female			0.00670	59	3
64	0.012959	0.447%	Occupation	Execmanagerial	Occupation	Execmanagerial			0.012027	frwgt	292.175.00	209923		0.00093	95	2
65	-0.011859	0.409%	CapitalGain	0	CapitalGain	0		7,073.50	-0.004171	Education	Masters			0.00406	101	13
66	0.011698	0.404%	Age	43	Age	43	35.5	43.50	0.004096	Occupation	Execmanagerial			0.01120	22	3
67	0.011555	0.399%	Age	43	Age	43	36.5	43.50	0.005752	frwgt	292.175.00	128888		0.00480	26	20
68	0.010712	0.370%	HoursPerWeek	45	HoursPerWeek	45	41.5	49.50	0.005233	NativeCountry	UnitedStates			0.00548	77	3
69	-0.010109	0.349%	CapitalLoss	0	CapitalLoss	0			-0.004134	Relationship	Unmarried			-0.00377	46	0
70	0.009475	0.327%	HoursPerWeek	45	HoursPerWeek	45	41.5	49.50	0.004675						6	2
71	-0.008703	0.300%	CapitalGain	0	CapitalGain	0		4,668.50	-0.002636	EducationNum	14.00	12.5		-0.00255	103	8
72	-0.008539	0.295%	NativeCountry	UnitedStates	NativeCountry	UnitedStates			-0.001733	WorkClass	Selfempnotinc			-0.00681	91	0
73	0.008134	0.281%	Age	43	Age	43	29.5		0.008134						0	1
74	-0.007877	0.272%	Age	43	Age	43	42.5	43.50	-0.003855	CapitalLoss	-			-0.00406	15	22
75	-0.007657	0.264%	Age	43	Age	43	41.5	49.50	-0.003811	Relationship	Unmarried			-0.00383	24	13
76	0.007384	0.262%	Age	43	Age	43	38.5	43.50	0.003531	NativeCountry	UnitedStates			0.00405	21	6
77	-0.007412	0.256%	EducationNum	14	EducationNum	14			-0.003663	Relationship	Unmarried			-0.00375	65	0
78	0.007165	0.247%	Education	Masters	Education	Masters			0.007165	WorkClass	Selfempnotinc			0.00006	17	0
79	-0.006413	0.221%	CapitalLoss	0	CapitalLoss	0			-0.003041	Gender	Female			-0.00337	41	0
80	0.006186	0.213%	CapitalLoss	0	CapitalLoss	0		1,568.50	0.003042	frwgt	292.175.00	209923		0.00314	48	1
81	-0.006110	0.211%	Relationship	Unmarried	Relationship	Unmarried			-0.006110						11	0
82	-0.005963	0.206%	CapitalLoss	0	CapitalLoss	0		77.50	-0.016886	NativeCountry	UnitedStates			0.02102	44	0
83	-0.005790	0.198%	CapitalLoss	0	CapitalLoss	0		1,820.50	-0.005974	Education	Masters			0.00004	39	0
84	0.005500	0.176%	WorkClass	Selfempnotinc	WorkClass	Selfempnotinc			0.005133	frwgt	292.175.00	209923		0.00357	100	2
85	-0.004350	0.150%	CapitalLoss	0	CapitalLoss	0		1,115.00	-0.004350						2	0
86	0.004166	0.144%	Age	43	Age	43	38.5	43.50	0.003891	Race	White			0.00227	23	6
87	0.003892	0.134%	HoursPerWeek	45	HoursPerWeek	45	41.5	49.50	0.004612	WorkClass	Selfempnotinc			-0.00072	81	2
88	0.003394	0.117%	CapitalGain	0	CapitalGain	0		57.00	-0.007656	NativeCountry	UnitedStates			0.01105	33	0
89	0.003209	0.111%	Education	Masters	Education	Masters			0.001435	NativeCountry	UnitedStates			0.00177	53	0
90	-0.003124	0.108%	EducationNum	14	EducationNum	14			-0.003141	HoursPerWeek	45.00			-0.00138	60	0
91	0.002969	0.102%	NativeCountry	UnitedStates	NativeCountry	UnitedStates			0.002969						8	0
92	0.002555	0.102%	CapitalGain	0	CapitalGain	0		57.00	0.000687	Race	White			0.00227	35	0
93	0.002882	0.099%	Education	Masters	Education	Masters			0.002882						3	0
94	-0.002851	0.098%	Race	White	Race	White			-0.000338	WorkClass	Selfempnotinc			-0.00381	97	0
95	-0.002693	0.093%	Education	Masters	Education	Masters			-0.001774	Race	White			-0.00092	55	0
96	-0.002518	0.087%	Education	Masters	Education	Masters			-0.000999	frwgt	292.175.00			-0.00152	58	0
97	-0.002073	0.072%	Race	White	Race	White			-0.002073						10	0
98	-0.002045	0.071%	CapitalGain	0	CapitalGain											



← FIT TO DATA

FIT FOR PURPOSE →

A statistically perfect prediction can
be a catastrophic decision



MAKING BETTER DECISIONS

CHOICE

empowers good decisions

OVERSIGHT

empowers fair decisions

CERTAINTY

empowers safe decisions

UNDERSTANDING

empowers smart decisions

powered by UMNAI

HYBRID INTELLIGENCE

THE DATA

PREDICTION
& LOCAL
EXPLANATION
OBJECT

GLOBAL
EXPLANATION
OBJECT

MODEL
ACTIVATION
DATA

EXPLANATION
DATA LAKE
INSIGHTS

THE DECISION WORKFLOW

IS THE PREDICTION
FIT-FOR-PURPOSE?

IDENTIFY

WHAT WOULD MAKE IT
FIT-FOR-PURPOSE?

ASSESS

MAKE THE DECISION
FIT-FOR-PURPOSE

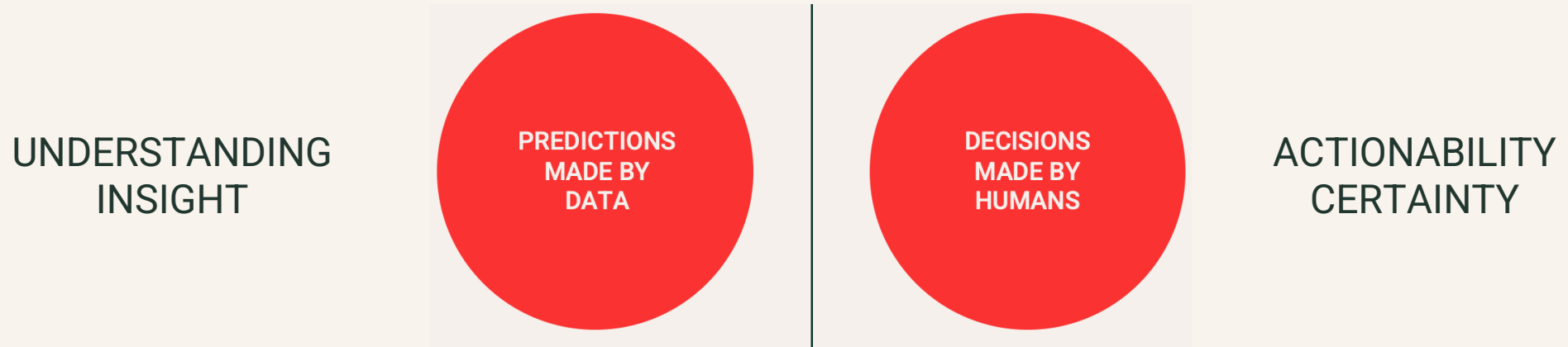
RESOLVE

THE EXPLANATION AND EVIDENCE

IMMUTABLE AUDIT RECORD

STAKEHOLDER CURATED
EXPLANATIONS

A WHOLE NEW PLAYING FIELD



THE CODIFICATION OF INTENTION, OBLIGATION, ETHICS, KNOWLEDGE, CONTROLS



AUDTIABILITY

Full, granular compute graph of every prediction communicated directly by the model in real time. UVC codes inherently added for immutability, DLT compatible

Auditability solved out of the box

EXPLAINABILITY

Full, granular, decomposed attributions underpinning each prediction communicated directly by the model in real time.

Understand your use case and stakeholders and build stakeholder appropriate explanations.

Explainability solved out of the box

RISK CONFIDENCE

Hesitation, friction and conflict in internal risk assessment of potential, proposed or existing AI applications. Stakeholder support and buy-in.

- Identify and assess risks with absolute, verifiable certainty
- Manage system and functional risks with precise, actionable and instant monitoring

DATA LAKE

The precise and complete audit record of every computation for every prediction made plus every identification, assessment and resolution applied

CODIFIED RISK TESTS

Applied to data lake periodically or in real/near time if justified

REPORT

Globally, individual items of interest with drill down to most granular detail if required

HIGH VELOCITY ANYTHING

Catastrophic failure, costs of delay/hesitation, ungraceful failure, confidence

- Monitor partition activation data and phase changes along to determine functional change within model.
- Build alternate failsafe/fallback logic actioned when things go wrong

ACTIVATION MAP

Every partition activated for every query provides precise ground truth for anomaly detection.

ANTICIPATE AND IDENTIFY

Build monitoring tools to anticipate and identify functional anomalies or incoherencies before/as they happen

ACT GRACEFULLY

Build immediate fail-safes/fallbacks that gracefully handle anomalies as they happen

SUSPICIOUS TRANSACTION MONITORING

Incredible level of false positives, huge cost of investigation, significant regulatory risk exposure

- Subject positives to additional, human codified, sanity and severity checks prior to investigation
- Cut investigation time by explaining positive flagging attributions

HUMAN CODIFIED FILTERING

Apply human derived tests and risk assessments on data classified positives to eliminate the low risk flagged transactions

INFORM and UNDERSTAND

Provide investigators with a complete “here is why this was flagged” before they start investigating

IMPROVE

Constantly evolve and improve the decision flows to enrich the codification and efficacy of the decision flows

BIAS and FAIRNESS

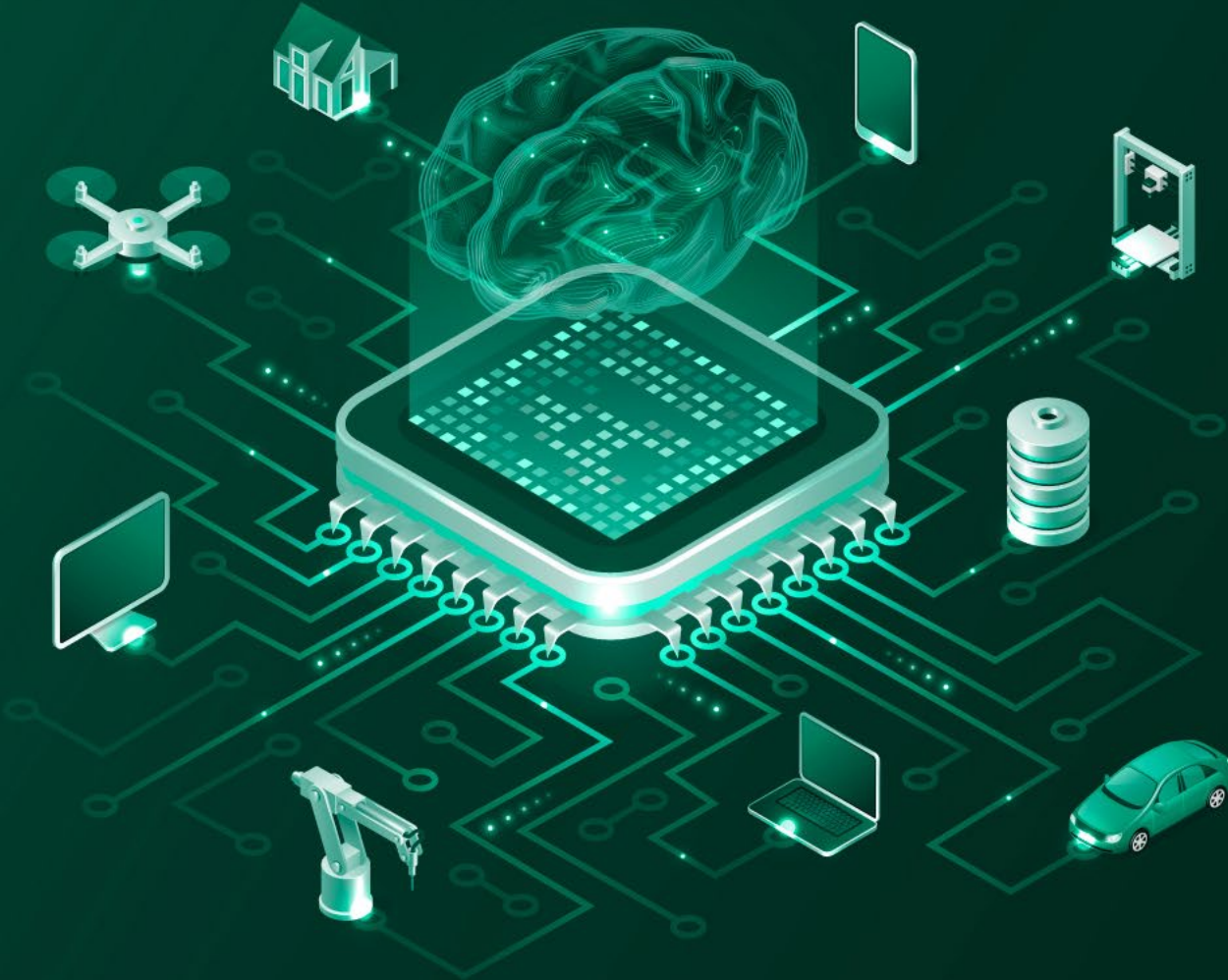
RANK	TOTAL		%	CONTRIBUTION		FEATURE	INPUT	BIN LOW	BIN HIGH	ATTRIBUTION	FEATURE	INPUT	BIN LOW	BIN HIGH	ATTRIBUTION	ACTIVATION	
	Attribution	Module		Attribution	Partition											Module	Partition
1	0.164473	5.675%	Education	Masters	0.132569	Occupation	Managerial			0.03190	54	4					
2	-0.122653	4.232%	Gender	Female	-0.081230	MaritalStatus	Divorced			-0.04142	69	0					
3	0.091327	3.151%	EducationYrs	14	0.045510	Race	White			0.04582	64	6					
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5	0.069460	2.397%	Age	43	0.034457	Gender	Female			0.03500	18	50					
6	-0.063308	2.251%	MaritalStatus	Divorced	-0.034191	Race	White			-0.03112	85	0					
7	-0.062954	2.172%	CapitalGain	0	-0.021263	Education	Masters			-0.01926	102	0					
8	0.041614	2.128%	Age	43	0.030095	Education	Masters			0.02008	16	11					
9	-0.017193	1.980%	MaritalStatus	Divorced	-0.012884	Relationship	Unmarried			-0.01241	86	0					
10	-0.056506	1.950%	Gender	Female	-0.028933	Relationship	Unmarried			-0.02757	73	0					
11	-0.054822	1.892%	MaritalStatus	Divorced	-0.031486	WorkClass	Selfempnotinc			-0.02334	87	0					
12	-0.053502	1.846%	HoursPerWeek	45	0.012145	Occupation	Execmanagerial			0.04116	78	2					
13	-0.052726	1.812%	CapitalLoss	0	-0.020297	MaritalStatus	Divorced			-0.02670	42	0					
14	-0.051762	1.768%	Education	Masters	-0.022782	MaritalStatus	Divorced			-0.02898	52	0					
15	-0.051227	1.768%	MaritalStatus	Divorced	-0.051227						7	0					
16	-0.049790	1.718%	Age	43	0.049727	MaritalStatus	Divorced			-0.02506	20	5					
17	0.049447	1.700%	HoursPerWeek	45	0.024624	Relationship	Unmarried			0.021482	80	5					
18	0.048118	1.661%	NativeCountry	UnitedStates	0.025282	Occupation	Execmanagerial			0.02286	89	3					
19	0.047822	1.650%	CapitalGain	0	0.026312	Education	Masters			0.02419	28	5					
20	0.047618	1.643%	EducationNum	14	0.028111	frwgt	292,175.00			0.02381	67	5					
21	-0.046361	1.600%	frwgt	292175	275969	frwgt	292,175.00			-0.046361	13	8					
22	-0.046279	1.597%	MaritalStatus	Divorced	-0.023886	frwgt	292,175.00			-0.02239	88	0					
23	-0.045163	1.558%	NativeCountry	UnitedStates	-0.046199	NativeCountry	UnitedStates			0.00104	83	0					
24	0.044728	1.543%	CapitalGain	0	5,119.00	EducationNum	14.00	13.5	0.02243	29	16						
25	-0.044471	1.514%	CapitalLoss	0	1,119.00	WorkClass	Selfempnotinc			-0.02132	37	1					
26	-0.044060	1.510%	CapitalGain	0	2,337.50	MaritalStatus	Divorced			-0.02273	32	0					
27	0.043328	1.495%	HoursPerWeek	45	0.021302	MaritalStatus	Divorced			0.02203	76	3					
28	-0.043121	1.488%	CapitalGain	0	7,073.50	Occupation	Execmanagerial			-0.02755	105	0					
29	0.043124	1.460%	Occupation	Execmanagerial	0.043124	Occupation	Execmanagerial			0.043124	6	9					
30	-0.039117	1.350%	CapitalLoss	0	1,820.50	WorkClass	Selfempnotinc			-0.02078	47	0					
31	-0.037977	1.310%	Gender	Female	-0.018963	frwgt	292,175.00	192285		-0.01901	75	8					
32	0.037861	1.306%	Occupation	Execmanagerial	0.018507	Race	White			0.01935	92	0					
33	-0.037582	1.297%	CapitalGain	0	-0.020212	Relationship	Unmarried			-0.02788	36	0					
34	-0.037430	1.291%	CapitalLoss	0	-0.055660	Occupation	Execmanagerial			0.05399	45	0					
35	0.037315	1.287%	CapitalGain	0	5,119.00	Occupation	Execmanagerial			0.01885	34	4					
36	-0.037219	1.284%	Occupation	Execmanagerial	-0.019071	WorkClass	Selfempnotinc			-0.01815	94	0					
37	0.036714	1.267%	Education	Masters	0.021799	HoursPerWeek	45.00	41.00		0.021492	51	2					
38	0.034516	1.191%	EducationNum	14	0.017224	NativeCountry	UnitedStates			0.01729	62	2					
39	-0.034343	1.185%	Gender	Female	-0.017436	WorkClass	Selfempnotinc			-0.01691	74	0					
40	-0.033291	1.149%	Gender	Female	-0.018080	Occupation	Execmanagerial			-0.01521	71	0					
41	-0.032943	1.137%	EducationNum	14	-0.016446	MaritalStatus	Divorced			-0.01650	61	1					
42	0.032013																
43	0.031804																
44	0.030897																
45	0.030107																
46	-0.028138																
47	-0.028089																
48	0.027980																
49	0.018166																
50	-0.026003																
51	-0.022881																
52	0.021853																
53	-0.020570																
54	-0.018508																
55	-0.018544																
56	0.018049																
57	0.016666																
58	-0.016030																
59	0.015487																
60	0.016278																
61	0.015996																
62	-0.013451																
63	0.013404																
64	0.012959																
65	0.011859	0.409%	CapitalGain	0	7,073.50	Education	Masters			0.004171	201	13					
66	0.011698	0.404%	Age	43	35.5	Occupation	Execmanagerial			0.004996	0.01120	22	3				
67	0.011555	0.399%	Age	43	36.5	frwgt	292,175.00	128888		0.00580	26	20					
68	0.010712	0.370%	HoursPerWeek	45	41.5	NativeCountry	UnitedStates			0.00548	77	3					
69	-0.010109	0.349%	CapitalLoss	0		Relationship	Unmarried			-0.00577	46	0					
70	0.009475	0.327%	HoursPerWeek	45	41.5	frwgt	292,175.00				6	2					
71	-0.008703	0.300%	CapitalGain	0	4,668.50	EducationNum	14.00	12.5	-0.00255	103	8						
72	-0.008539	0.295%	NativeCountry	UnitedStates	-0.001733	WorkClass	Selfempnotinc			-0.00681	91	0					
73	0.008134	0.281%	Age	43	29.5	0.008134				0	1						
74	-0.007877	0.272%	Age	43	42.5	0.003855	CapitalLoss			-0.00406	15	22					
75	-0.007657	0.264%	Age	43	41.5	0.003811	Relationship	Unmarried		-0.00383	24	13					
76	0.007384	0.262%	Age	43	38.5	0.003531	NativeCountry	UnitedStates		0.00405	21	6					
77	-0.007412	0.256%	EducationNum	14		-0.003663	Relationship	Unmarried		-0.00375	65	0					
78	0.007165	0.247%	Education	Masters		0.007168	WorkClass	Selfempnotinc		0.00606	57	0					
79	-0.006413	0.221%	CapitalLoss	0		-0.003041	Gender	Female		-0.00337	41	0					
80	0.006186	0.213%	CapitalLoss	0	1,568.50	frwgt	292,175.00	209923		0.00314	48	1					
81	-0.006110	0.211%	Relationship	Unmarried		-0.006110					11	0					
82	-0.005963	0.206%	CapitalLoss	0	77.50	NativeCountry	UnitedStates			0.00292	44	0					
83	-0.005790	0.198%	CapitalLoss	0	1,820.50	Education	Masters			0.00004	39	0					
84	0.005500	0.176%	WorkClass	Selfempnotinc	0.005133	frwgt	292,175.00	209923		0.00357	100	2					
85	-0.004550	0.150%	CapitalLoss	0	1,115.00	-0.004550					2	0					
86	0.004166	0.144%	Age	43	38.5	0.004166	Race	White		0.00227	23	6					
87	0.003892	0.134%	HoursPerWeek	45	41.5	0.004612	WorkClass	Selfempnotinc		-0.00072	81	2					
88	0.003394	0.117%	CapitalGain	0	57.00	-0.007656	NativeCountry	UnitedStates		0.01105	33	0					
89	0.003209	0.111%	Education	Masters		0.001435	NativeCountry	UnitedStates		0.00177	53	0					
90	-0.003124	0.108%	EducationNum	14		-0.003141	HoursPerWeek	45.00		-0.00158	60	0					
91	0.002969	0.102%	NativeCountry	UnitedStates	0.002969						8	0					
92	0.002955	0.102%	CapitalGain	0	57.00	0.000687	Race	White		0.00227	35	0					
93	0.002882	0.099%	Education	Masters		0.002882					3	0					
94	-0.002851	0.098%	Race	White		-0.000338	WorkClass	Selfempnotinc		-0.00281	97	0					
95	-0.002693	0.093%	Education	Masters		-0.001774	Race	White		-0.00092	55	0					
96	-0.002518	0.087%	Education	Masters		-0.000999	frwgt	292,175.00		-0.00152	58	0					
97	-0.002073	0.072%	Race	White		-0.002073					10	0					
98	-0.002045	0.071%	CapitalGain	0	57.00	frwgt	292,175.00			-0.00094	38	0					
99	0.001786	0.062%	CapitalGain	0	7,073.50	EducationYrs	14.00	13.5	0.00094	104	8						
100	0.001776	0.061%	EducationYrs	14		0.001776					4	0			</		

BIAS and FAIRNESS

MODULE INTERACTION	FEMALE GENDER		INTERACTING WITH	
	FEATURE	ATTRIBUTION	FEATURE	ATTRIBUTION
Gender x MaritalStatus	Gender	-0.08123	MaritalStatus	-0.04142
Gender x Age	Gender	0.03500	Age	0.03446
Gender x Relationship	Gender	-0.02893	Relationship	-0.02757
Gender x fnlwgt	Gender	-0.01896	fnlwgt	-0.01901
Gender x WorkClass	Gender	-0.01744	WorkClass	-0.01691
Gender x Occupation	Gender	-0.01808	Occupation	-0.01521
Gender x Race	Gender	-0.01627	Race	-0.01553
Gender x NativeCountry	Gender	-0.01310	NativeCountry	-0.01290
Gender x CapitalGain	Gender	-0.01461	CapitalGain	-0.00827
Gender	Gender	-0.01854		
Gender x EducationNum	Gender	0.00670	EducationNum	0.00670
Gender x CapitalLoss	Gender	-0.00337	CapitalLoss	-0.00304
Gender x HoursPerWeek	Gender	0.00062	HoursPerWeek	0.00062
Gender x Education	Gender	-0.00167	Education	0.00045
	Negatives	-0.23222		
	Positives	0.04232		
	Total	-0.18989		

Original Prediction Score	-0.209330
minus	
Negative Attributions	-0.232215
equals	
Adjusted Prediction Score	0.022885

UMNAI



COLLABORATE WITH US

- Research
- Application
- Co-development
- Consultants/system integrator
- Sales partners
- Platforms

THANK YOU

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-0.0000377958785975352*Race_White - 0.0000377958785975352*Relationship_Unmarried - 0.0844129174947739

NEURAL-MICRO-MODEL EXPRESSION : EXAMPLE 1

0.00106377946212888*MaritalStatus_Divorced + 0.00172187818679959*MaritalStatus_MarriedAFspouse -
0.000123299338156357*MaritalStatus_Marriedspouseabsent - 0.00230870861560106*MaritalStatus_Nevermarried -
0.00081091292668134*MaritalStatus_Separated + 0.00257309433072805*MaritalStatus_Widowed + 0.000447018042905256*Relationship_Husband +
0.00730239134281874*Relationship_Notinfamily - 0.00183948513586074*Relationship_Otherrelative - 0.00383506948128343*Relationship_Ownchild -
0.000360738165909424*Relationship_Unmarried + 0.00137223361525685*Relationship_Wife - 0.0580957233905792

NEURAL-MICRO-MODEL EXPRESSION : EXAMPLE 2

3.08478083752561e-5*EducationNum + 0.00134426879230887

NEURAL-MICRO-MODEL EXPRESSION : EXAMPLE 3

SIMPLE TO DEPLOY, OPERATE AND USE

- Libraries deploy and operate in client's environment
- Native cloud support
- Minimal DevOps effort
- Support for notebook systems
- Easy MLOps Integration
- Drop-in replacement
- Easy up/down stream integration
- Universally compatible outputs
- Use standard BI and Data Lake tools

