**WAY TOO MANY TO PRINT TOKENS.**

Token: [hold 37] ||| Value: [[{0: [[6488], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [37 IV] ||| Value: [[{0: [[6489], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [IV Conclusions] ||| Value: [[{0: [[6490], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Conclusions Using] ||| Value: [[{0: [[6491], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Using Higher-level] ||| Value: [[{0: [[6492], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Higher-level Causal] ||| Value: [[{0: [[6493], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Reasoning has] ||| Value: [[{0: [[6495], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [has shown] ||| Value: [[{0: [[6496], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [shown to] ||| Value: [[{0: [[6497], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [be a] ||| Value: [[{0: [[6499], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [useful technique] ||| Value: [[{0: [[6501], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [for introducing] ||| Value: [[{0: [[6503], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [introducing the] ||| Value: [[{0: [[6504], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [the flexibility] ||| Value: [[{0: [[6505], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [flexibility of] ||| Value: [[{0: [[6506], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [reasoning to] ||| Value: [[{0: [[6509], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [to complex] ||| Value: [[{0: [[6510], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [complex systems] ||| Value: [[{0: [[6511], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [systems for] ||| Value: [[{0: [[6512], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [which module-level] ||| Value: [[{0: [[6514], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [desired The] ||| Value: [[{0: [[6518], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [The use] ||| Value: [[{0: [[6519], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [reasoning however] ||| Value: [[{0: [[6523], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [however introduces] ||| Value: [[{0: [[6524], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [introduces unique] ||| Value: [[{0: [[6525], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [unique additional] ||| Value: [[{0: [[6526], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [additional considerations] ||| Value: [[{0: [[6527], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [considerations Methods] ||| Value: [[{0: [[6528], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Methods of] ||| Value: [[{0: [[6529], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [of assuming] ||| Value: [[{0: [[6530], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [assuming n] ||| Value: [[{0: [[6531], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [n faults] ||| Value: [[{0: [[6532], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [faults to] ||| Value: [[{0: [[6533], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [present fail] ||| Value: [[{0: [[6536], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [fail due] ||| Value: [[{0: [[6537], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [due to] ||| Value: [[{0: [[6538], 0.0001476886722788362, 0.0003825531185121587], 1: [[1195, 1527, 1561], 0.0013767783386874712, 0.0035662237247992105], 33: [[1875, 1895], 0.0007382798080472499, 0.001912341945696439]}, 2.5902671654458267]]

Token: [the many-to-many] ||| Value: [[{0: [[6540], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [many-to-many mapping] ||| Value: [[{0: [[6541], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [between physical] ||| Value: [[{0: [[6543], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [processes and] ||| Value: [[{0: [[6545], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and high-level] ||| Value: [[{0: [[6546], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [relationships Additionally] ||| Value: [[{0: [[6549], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Additionally incompleteness] ||| Value: [[{0: [[6550], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [incompleteness in] ||| Value: [[{0: [[6551], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [in knowledge-engineered] ||| Value: [[{0: [[6552], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [knowledge-engineered causal] ||| Value: [[{0: [[6553], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [rules prevents] ||| Value: [[{0: [[6555], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [prevents their] ||| Value: [[{0: [[6556], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [their use] ||| Value: [[{0: [[6557], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [use for] ||| Value: [[{0: [[6558], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [for accurate] ||| Value: [[{0: [[6559], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [accurate inference] ||| Value: [[{0: [[6560], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [inference about] ||| Value: [[{0: [[6561], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [internal state] ||| Value: [[{0: [[6564], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [state of] ||| Value: [[{0: [[6565], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [system under] ||| Value: [[{0: [[6568], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [under diagnosis] ||| Value: [[{0: [[6569], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [diagnosis For] ||| Value: [[{0: [[6570], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [For these] ||| Value: [[{0: [[6571], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [these reasons] ||| Value: [[{0: [[6572], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [reasons ,] ||| Value: [[{0: [[6573], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [, ``] ||| Value: [[{0: [[6574, 6737], 0.0002953773445576724, 0.0005603662634428833], 25: [[80], 0.010752688172043012, 0.020399139622428834], 28: [[77, 110], 0.016, 0.0303539197581741], 30: [[45], 0.012987012987012988, 0.024637921881634824], 31: [[78], 0.01098901098901099, 0.02084747236138331], 32: [[61], 0.0136986301369863, 0.025987944998436728]}, 1.8971199848858813]]

Token: [`` evidence] ||| Value: [[{0: [[6575], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [rules were] ||| Value: [[{0: [[6577], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [were introduced] ||| Value: [[{0: [[6578], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [introduced to] ||| Value: [[{0: [[6579], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [to complement] ||| Value: [[{0: [[6580], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [complement the] ||| Value: [[{0: [[6581], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [rules A] ||| Value: [[{0: [[6584], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [A prototype] ||| Value: [[{0: [[6585], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [prototype system] ||| Value: [[{0: [[6586], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [FEXPR has] ||| Value: [[{0: [[6588], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [been successfully] ||| Value: [[{0: [[6590], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [successfully implemented] ||| Value: [[{0: [[6591], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [implemented to] ||| Value: [[{0: [[6592], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [demonstrate the] ||| Value: [[{0: [[6594], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [causal diagnosis] ||| Value: [[{0: [[6597], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [diagnosis approach] ||| Value: [[{0: [[6598], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [approach Current] ||| Value: [[{0: [[6599], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Current work] ||| Value: [[{0: [[6600], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [work includes] ||| Value: [[{0: [[6601], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [includes the] ||| Value: [[{0: [[6602], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [the incorporation] ||| Value: [[{0: [[6603], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [incorporation of] ||| Value: [[{0: [[6604], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [of temporal] ||| Value: [[{0: [[6605], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [temporal reasoning] ||| Value: [[{0: [[6606], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [reasoning capabilities] ||| Value: [[{0: [[6607], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [capabilities to] ||| Value: [[{0: [[6608], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [to allow] ||| Value: [[{0: [[6609], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [allow more] ||| Value: [[{0: [[6610], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [more sophisticated] ||| Value: [[{0: [[6611], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [sophisticated diagnosis] ||| Value: [[{0: [[6612], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [diagnosis and] ||| Value: [[{0: [[6613], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [input generation] ||| Value: [[{0: [[6616], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [generation Additionally] ||| Value: [[{0: [[6617], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Additionally ,] ||| Value: [[{0: [[6618], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [, techniques] ||| Value: [[{0: [[6619], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [techniques for] ||| Value: [[{0: [[6620], 0.0001476886722788362, 0.00044243572198404826], 33: [[2255], 0.00036913990402362494, 0.001105844323940196]}, 2.995732273553991]]

Token: [a more] ||| Value: [[{0: [[6622], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [more automatic] ||| Value: [[{0: [[6623], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [automatic generation] ||| Value: [[{0: [[6624], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [generation of] ||| Value: [[{0: [[6625], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [rules based] ||| Value: [[{0: [[6628], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [based on] ||| Value: [[{0: [[6629, 6683], 0.0002953773445576724, 0.0007651062370243174], 1: [[1694, 1790, 2046], 0.0013767783386874712, 0.0035662237247992105], 37: [[189, 224], 0.006472491909385114, 0.016765483271494026]}, 2.5902671654458267]]

Token: [on causal] ||| Value: [[{0: [[6630], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and properties] ||| Value: [[{0: [[6633], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [properties of] ||| Value: [[{0: [[6634], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [of classes] ||| Value: [[{0: [[6635], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [classes of] ||| Value: [[{0: [[6636], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and their] ||| Value: [[{0: [[6639], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [their consitituent] ||| Value: [[{0: [[6640], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [consitituent signals] ||| Value: [[{0: [[6641], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [being considered] ||| Value: [[{0: [[6644], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [considered REFERENCES] ||| Value: [[{0: [[6645], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [REFERENCES l] ||| Value: [[{0: [[6646], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [l P] ||| Value: [[{0: [[6647], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [P Schaefer] ||| Value: [[{0: [[6648], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Schaefer and] ||| Value: [[{0: [[6649], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and H.A] ||| Value: [[{0: [[6650, 6734], 0.0002953773445576724, 0.0010896114175495306]}, 3.6888794541139363]]

Token: [H.A Guvenir] ||| Value: [[{0: [[6651], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Guvenir Using] ||| Value: [[{0: [[6652], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Using Expert] ||| Value: [[{0: [[6653], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Expert Systems] ||| Value: [[{0: [[6654], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Systems to] ||| Value: [[{0: [[6655], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [to Troubleshoot] ||| Value: [[{0: [[6656], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Troubleshoot Microprocessor] ||| Value: [[{0: [[6657], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Microprocessor Based] ||| Value: [[{0: [[6658], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Based Control] ||| Value: [[{0: [[6659], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Control Systems] ||| Value: [[{0: [[6660], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Systems An] ||| Value: [[{0: [[6661], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [An Expectation] ||| Value: [[{0: [[6662], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Expectation Based] ||| Value: [[{0: [[6663], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Based Approach] ||| Value: [[{0: [[6664], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Approach IFAC] ||| Value: [[{0: [[6665], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [IFAC Symp] ||| Value: [[{0: [[6666], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Symp Microcomputer] ||| Value: [[{0: [[6667], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Microcomputer Application] ||| Value: [[{0: [[6668], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Application in] ||| Value: [[{0: [[6669], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [in Process] ||| Value: [[{0: [[6670], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Process Control] ||| Value: [[{0: [[6671], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Control 1986] ||| Value: [[{0: [[6672], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [1986 2] ||| Value: [[{0: [[6673], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [2 J] ||| Value: [[{0: [[6674], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [J DeKleer] ||| Value: [[{0: [[6675], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [DeKleer and] ||| Value: [[{0: [[6676], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and J.S] ||| Value: [[{0: [[6677], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [J.S Brown] ||| Value: [[{0: [[6678], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Brown A] ||| Value: [[{0: [[6679], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [A Qualitative] ||| Value: [[{0: [[6680], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Qualitative Physics] ||| Value: [[{0: [[6681], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Physics based] ||| Value: [[{0: [[6682], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [on Confluences] ||| Value: [[{0: [[6684], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Confluences in] ||| Value: [[{0: [[6685], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [in Qualitative] ||| Value: [[{0: [[6686], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Qualitative Reasoning] ||| Value: [[{0: [[6687], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Reasoning about] ||| Value: [[{0: [[6688], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [about Physical] ||| Value: [[{0: [[6689], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Physical Systems] ||| Value: [[{0: [[6690], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Systems Elsevier] ||| Value: [[{0: [[6691], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Elsevier Science] ||| Value: [[{0: [[6692], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Science Publishers] ||| Value: [[{0: [[6693], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Publishers 1984] ||| Value: [[{0: [[6694], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [1984 3] ||| Value: [[{0: [[6695], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [3 Randall] ||| Value: [[{0: [[6696], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Randall Davis] ||| Value: [[{0: [[6697], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Davis Diagnostic] ||| Value: [[{0: [[6698], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Diagnostic Reasoning] ||| Value: [[{0: [[6699], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Reasoning Based] ||| Value: [[{0: [[6700], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Based on] ||| Value: [[{0: [[6701], 0.0001476886722788362, 0.00044243572198404826], 1: [[1779], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [on Structure] ||| Value: [[{0: [[6702], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Structure and] ||| Value: [[{0: [[6703], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and Behavior] ||| Value: [[{0: [[6704], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Behavior A.I.Memo] ||| Value: [[{0: [[6705], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [A.I.Memo 739] ||| Value: [[{0: [[6706], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [739 M.I.T] ||| Value: [[{0: [[6707], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [M.I.T June] ||| Value: [[{0: [[6708], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [June 1984] ||| Value: [[{0: [[6709], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [1984 4] ||| Value: [[{0: [[6710], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [4 Yung-Choa] ||| Value: [[{0: [[6711], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Yung-Choa Pan] ||| Value: [[{0: [[6712], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Pan Qualitative] ||| Value: [[{0: [[6713], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Qualitative Reasonings] ||| Value: [[{0: [[6714], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Reasonings with] ||| Value: [[{0: [[6715], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [with Deep-Level] ||| Value: [[{0: [[6716], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Deep-Level Mechanisms] ||| Value: [[{0: [[6717], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Mechanisms for] ||| Value: [[{0: [[6718], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [for Diagnosis] ||| Value: [[{0: [[6719], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Diagnosis of] ||| Value: [[{0: [[6720], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [of Dependent] ||| Value: [[{0: [[6721], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Dependent Failures] ||| Value: [[{0: [[6722], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Failures Ph.D] ||| Value: [[{0: [[6723], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Ph.D Dissertation] ||| Value: [[{0: [[6724], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Dissertation Univ] ||| Value: [[{0: [[6725], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Univ Illinois] ||| Value: [[{0: [[6726], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Illinois at] ||| Value: [[{0: [[6727], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [at Urbana-Champaign] ||| Value: [[{0: [[6728], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Urbana-Champaign 1983] ||| Value: [[{0: [[6729], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [1983 SI] ||| Value: [[{0: [[6730], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [SI Y] ||| Value: [[{0: [[6731], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Y Iwasaki] ||| Value: [[{0: [[6732], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Iwasaki and] ||| Value: [[{0: [[6733], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [H.A Simon] ||| Value: [[{0: [[6735], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Simon ,] ||| Value: [[{0: [[6736], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [`` Causality] ||| Value: [[{0: [[6738], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Causality in] ||| Value: [[{0: [[6739], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [in Device] ||| Value: [[{0: [[6740], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Device Behavior] ||| Value: [[{0: [[6741], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Behavior Artificial] ||| Value: [[{0: [[6742], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Intelligence 29] ||| Value: [[{0: [[6744], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [29 pp] ||| Value: [[{0: [[6745], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [pp 3-32] ||| Value: [[{0: [[6746], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [3-32 1986] ||| Value: [[{0: [[6747], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [1986 38] ||| Value: [[{0: [[6748], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [38 Figure] ||| Value: [[{0: [[6749], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [3 Current] ||| Value: [[{0: [[6751], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Current beneflts] ||| Value: [[{0: [[6752], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [beneflts and] ||| Value: [[{0: [[6753], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [and estimated] ||| Value: [[{0: [[6754], 0.0001476886722788362, 0.00044243572198404826], 1: [[1803], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [estimated final] ||| Value: [[{0: [[6755], 0.0001476886722788362, 0.00044243572198404826], 1: [[1804], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [final benefits] ||| Value: [[{0: [[6756], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [benefits when] ||| Value: [[{0: [[6757], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [when sampling] ||| Value: [[{0: [[6758], 0.0001476886722788362, 0.00044243572198404826], 1: [[1807], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [sampling size] ||| Value: [[{0: [[6759], 0.0001476886722788362, 0.00044243572198404826], 1: [[1231, 1808], 0.0009178522257916476, 0.0027496395351574035]}, 2.995732273553991]]

Token: [size k] ||| Value: [[{0: [[6760], 0.0001476886722788362, 0.00044243572198404826], 1: [[1232, 1809], 0.0009178522257916476, 0.0027496395351574035]}, 2.995732273553991]]

Token: [k Increases] ||| Value: [[{0: [[6761], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Increases up] ||| Value: [[{0: [[6762], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [up to] ||| Value: [[{0: [[6763], 0.0001476886722788362, 0.0003825531185121587], 1: [[1812, 1831], 0.0009178522257916476, 0.0023774824831994737], 33: [[2019], 0.00036913990402362494, 0.0009561709728482195]}, 2.5902671654458267]]

Token: [to K] ||| Value: [[{0: [[6764], 0.0001476886722788362, 0.00044243572198404826], 1: [[1813], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [K 256] ||| Value: [[{0: [[6765], 0.0001476886722788362, 0.00044243572198404826], 1: [[1462], 0.0004589261128958238, 0.0013748197675787018]}, 2.995732273553991]]

Token: [256 for] ||| Value: [[{0: [[6766], 0.0001476886722788362, 0.0005448057087747653]}, 3.6888794541139363]]

Token: [Mining MIT] ||| Value: [[{33: [[2358], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [MIT Press] ||| Value: [[{33: [[2359], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Press 1996] ||| Value: [[{33: [[2360], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [1996 R] ||| Value: [[{33: [[2361, 2391], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [wal and] ||| Value: [[{33: [[2364, 2394], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [J Shafer] ||| Value: [[{33: [[2366], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Shafer P] ||| Value: [[{33: [[2367], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [P arallel] ||| Value: [[{33: [[2368, 2672], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

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Token: [mining of] ||| Value: [[{33: [[2370, 2485], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [rules design] ||| Value: [[{33: [[2373], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [design implementation] ||| Value: [[{33: [[2374], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [implementation and] ||| Value: [[{33: [[2375], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [e xperience] ||| Value: [[{33: [[2377], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [xperience Technical] ||| Value: [[{33: [[2378], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Technical Report] ||| Value: [[{33: [[2379, 2682], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [Report RJ10004] ||| Value: [[{33: [[2380], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [RJ10004 IBM] ||| Value: [[{33: [[2381], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Center San] ||| Value: [[{33: [[2385], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Jose CA] ||| Value: [[{33: [[2387], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [CA 95120] ||| Value: [[{33: [[2388], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [95120 Jan] ||| Value: [[{33: [[2389], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Jan 1996] ||| Value: [[{33: [[2390], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Srikant F] ||| Value: [[{33: [[2397], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [ast algorithms] ||| Value: [[{33: [[2399], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [algorithms for] ||| Value: [[{33: [[2400, 2510], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [for mining] ||| Value: [[{33: [[2401, 2547, 2648], 0.0011074197120708748, 0.004085137822939021]}, 3.6888794541139363]]

Token: [mining association] ||| Value: [[{33: [[2402, 2548, 2649], 0.0011074197120708748, 0.004085137822939021]}, 3.6888794541139363]]

Token: [Proc 20th] ||| Value: [[{33: [[2406], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [20th VLDB] ||| Value: [[{33: [[2407], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [VLDB Conf] ||| Value: [[{33: [[2408, 2658], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [Conf Sept] ||| Value: [[{33: [[2409], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Sept 1994] ||| Value: [[{33: [[2410], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [1994 M] ||| Value: [[{33: [[2411], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [M Cierniak] ||| Value: [[{33: [[2412], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Cierniak W] ||| Value: [[{33: [[2413], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [W Li] ||| Value: [[{33: [[2414, 2670], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [Li and] ||| Value: [[{33: [[2415], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [M J] ||| Value: [[{33: [[2417, 2661], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [J Zaki] ||| Value: [[{33: [[2418, 2662], 0.0007382798080472499, 0.0027234252152926806]}, 3.6888794541139363]]

Token: [Zaki Loop] ||| Value: [[{33: [[2419], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Loop scheduling] ||| Value: [[{33: [[2420], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [scheduling for] ||| Value: [[{33: [[2421], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [for heterogeneity] ||| Value: [[{33: [[2422], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [heterogeneity I] ||| Value: [[{33: [[2423], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [n 4th] ||| Value: [[{33: [[2425], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [4th IEEE] ||| Value: [[{33: [[2426], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [IEEE Intl] ||| Value: [[{33: [[2427], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Intl Symposium] ||| Value: [[{33: [[2428], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Symposium on] ||| Value: [[{33: [[2429], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [on High-Performance] ||| Value: [[{33: [[2430], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [High-Performance Distributed] ||| Value: [[{33: [[2431], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Distributed Computing] ||| Value: [[{33: [[2432], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Computing also] ||| Value: [[{33: [[2433], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [also as] ||| Value: [[{33: [[2434], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [as URCS-TR] ||| Value: [[{33: [[2435], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [URCS-TR 540] ||| Value: [[{33: [[2436], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [540 CS] ||| Value: [[{33: [[2437], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [CS Dept] ||| Value: [[{33: [[2438], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Dept Univ] ||| Value: [[{33: [[2439], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Univ f] ||| Value: [[{33: [[2440], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [f Rochester] ||| Value: [[{33: [[2441], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Rochester Aug] ||| Value: [[{33: [[2442], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Aug 1995] ||| Value: [[{33: [[2443, 2477, 2608], 0.0011074197120708748, 0.004085137822939021]}, 3.6888794541139363]]

Token: [1995 M] ||| Value: [[{33: [[2444, 2478, 2660], 0.0011074197120708748, 0.004085137822939021]}, 3.6888794541139363]]

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Token: [Holsheimer M] ||| Value: [[{33: [[2446], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [ersten H] ||| Value: [[{33: [[2449], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [arthasarathy and] ||| Value: [[{33: [[2668], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [618 Department] ||| Value: [[{33: [[2684], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Department of] ||| Value: [[{33: [[2685], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [of Computer] ||| Value: [[{33: [[2686], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

Token: [Computer Science] ||| Value: [[{33: [[2687], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [Rochester 618] ||| Value: [[{33: [[2691], 0.00036913990402362494, 0.0013617126076463403]}, 3.6888794541139363]]

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Token: [0.45] ||| Value: [[{34: [[84], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [multi-level] ||| Value: [[{34: [[103], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [cube CrossSales] ||| Value: [[{34: [[110], 0.004694835680751174, 0.014064470767859112], 37: [[220], 0.003236245954692557, 0.00969492645163104]}, 2.995732273553991]]

Token: [CrossSales cell] ||| Value: [[{34: [[111], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [cell CrossSales] ||| Value: [[{34: [[112], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [CrossSales product] ||| Value: [[{34: [[113], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [product \221A\222] ||| Value: [[{34: [[114], 0.004694835680751174, 0.014064470767859112], 35: [[251, 272, 394], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [\221A\222 ,] ||| Value: [[{34: [[115], 0.004694835680751174, 0.014064470767859112], 35: [[252, 273, 395], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [product2 \221B\222] ||| Value: [[{34: [[117], 0.004694835680751174, 0.014064470767859112], 35: [[254, 275, 397], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [\221B\222 customer\_group] ||| Value: [[{34: [[118], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [customer\_group 221engineer\222] ||| Value: [[{34: [[119], 0.004694835680751174, 0.014064470767859112], 35: [[257, 278], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [221engineer\222 ,] ||| Value: [[{34: [[120], 0.004694835680751174, 0.014064470767859112], 35: [[258, 279], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [merchant \221Sears\222] ||| Value: [[{34: [[122], 0.004694835680751174, 0.014064470767859112], 35: [[260, 281], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [\221Sears\222 ,] ||| Value: [[{34: [[123, 158], 0.009389671361502348, 0.028128941535718224], 35: [[261, 282, 346, 378], 0.008247422680412371, 0.0247070702973525]}, 2.995732273553991]]

Token: [area \221Los] ||| Value: [[{34: [[125], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [\221Los Angeles\222] ||| Value: [[{34: [[126], 0.004694835680751174, 0.014064470767859112], 38: [[204], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [Angeles\222 ,] ||| Value: [[{34: [[127, 162], 0.009389671361502348, 0.03463736576632804]}, 3.6888794541139363]]

Token: [time 221Jan98\222] ||| Value: [[{34: [[129], 0.004694835680751174, 0.014064470767859112], 35: [[268], 0.002061855670103093, 0.006176767574338125]}, 2.995732273553991]]

Token: [221Jan98\222 represents] ||| Value: [[{34: [[130], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [represents the] ||| Value: [[{34: [[131], 0.004694835680751174, 0.014064470767859112], 35: [[411], 0.002061855670103093, 0.006176767574338125]}, 2.995732273553991]]

Token: [following multidimensional] ||| Value: [[{34: [[133], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [multidimensional rule] ||| Value: [[{34: [[134], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [rule x] ||| Value: [[{34: [[135], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [316 Customers] ||| Value: [[{34: [[137], 0.004694835680751174, 0.01216087871101327], 35: [[325, 357, 438], 0.006185567010309278, 0.01602227112646903], 38: [[180], 0.0035335689045936395, 0.009152887510409281]}, 2.5902671654458267]]

Token: [Customers :] ||| Value: [[{34: [[138], 0.004694835680751174, 0.014064470767859112], 35: [[326, 358, 439], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [, \221A\222] ||| Value: [[{34: [[143], 0.004694835680751174, 0.014064470767859112], 35: [[331, 363, 444], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [\221A\222 336] ||| Value: [[{34: [[144], 0.004694835680751174, 0.014064470767859112], 35: [[332, 364, 445], 0.006185567010309278, 0.018530302723014376]}, 2.995732273553991]]

Token: [, \221B\222] ||| Value: [[{34: [[149], 0.004694835680751174, 0.01216087871101327], 35: [[337, 369, 450], 0.006185567010309278, 0.01602227112646903], 38: [[196], 0.0035335689045936395, 0.009152887510409281]}, 2.5902671654458267]]

Token: [\221B\222 275] ||| Value: [[{34: [[150], 0.004694835680751174, 0.014064470767859112], 35: [[338, 370], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [275 customer\_group] ||| Value: [[{34: [[151], 0.004694835680751174, 0.014064470767859112], 35: [[339, 371], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [customer\_group =] ||| Value: [[{34: [[152], 0.004694835680751174, 0.014064470767859112], 35: [[340, 372], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [= \221engineer\222] ||| Value: [[{34: [[153], 0.004694835680751174, 0.014064470767859112], 35: [[341, 373], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [\221engineer\222 ,] ||| Value: [[{34: [[154], 0.004694835680751174, 0.014064470767859112], 35: [[342, 374], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [merchant =] ||| Value: [[{34: [[156], 0.004694835680751174, 0.014064470767859112], 35: [[344, 376], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [= \221Sears\222] ||| Value: [[{34: [[157], 0.004694835680751174, 0.014064470767859112], 35: [[345, 377], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [area 221Los] ||| Value: [[{34: [[160], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [221Los Angeles\222] ||| Value: [[{34: [[161], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [time =] ||| Value: [[{34: [[164], 0.004694835680751174, 0.014064470767859112], 35: [[353, 385], 0.004123711340206186, 0.01235353514867625]}, 2.995732273553991]]

Token: [= \221Jan98\222] ||| Value: [[{34: [[165], 0.004694835680751174, 0.014064470767859112], 35: [[354], 0.002061855670103093, 0.006176767574338125]}, 2.995732273553991]]

Token: [\221Jan98\222 If] ||| Value: [[{34: [[166], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [If this] ||| Value: [[{34: [[167], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [this cell] ||| Value: [[{34: [[168], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [cell has] ||| Value: [[{34: [[169], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [has value] ||| Value: [[{34: [[170, 182], 0.009389671361502348, 0.03463736576632804]}, 3.6888794541139363]]

Token: [value 4500] ||| Value: [[{34: [[171], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [4500 ,] ||| Value: [[{34: [[172], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [corresponding cell] ||| Value: [[{34: [[176], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [cell in] ||| Value: [[{34: [[177], 0.004694835680751174, 0.014064470767859112], 38: [[273], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [cube has] ||| Value: [[{34: [[181], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [value 10000] ||| Value: [[{34: [[183], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [10000 ,] ||| Value: [[{34: [[184], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [, then] ||| Value: [[{34: [[185], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [then this] ||| Value: [[{34: [[186], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [this rule] ||| Value: [[{34: [[187], 0.004694835680751174, 0.014064470767859112], 38: [[235], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [rule has] ||| Value: [[{34: [[188], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [has confidence] ||| Value: [[{34: [[189], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [confidence 0.45] ||| Value: [[{34: [[190], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [0.45 Next] ||| Value: [[{34: [[191], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [Next as] ||| Value: [[{34: [[192], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [the cubes] ||| Value: [[{34: [[194], 0.004694835680751174, 0.014064470767859112], 39: [[111], 0.004608294930875576, 0.01380521785047922]}, 2.995732273553991]]

Token: [cubes representing] ||| Value: [[{34: [[195], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [representing rules] ||| Value: [[{34: [[196], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [have hierarchical] ||| Value: [[{34: [[199], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [, they] ||| Value: [[{34: [[202], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [they represent] ||| Value: [[{34: [[203], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [represent not] ||| Value: [[{34: [[204], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [only multidimensional] ||| Value: [[{34: [[206], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [multidimensional but] ||| Value: [[{34: [[207], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [but also] ||| Value: [[{34: [[208], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [also multi-level] ||| Value: [[{34: [[209], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [multi-level association] ||| Value: [[{34: [[210], 0.004694835680751174, 0.01731868288316402]}, 3.6888794541139363]]

Token: [crosssales\] ||| Value: [[{35: [[6, 27, 149], 0.006185567010309278, 0.022817811056374863]}, 3.6888794541139363]]

Token: [\221] ||| Value: [[{35: [[21, 42, 144], 0.006185567010309278, 0.018530302723014376], 38: [[47, 57], 0.007067137809187279, 0.02117125281663598]}, 2.995732273553991]]

Token: [222] ||| Value: [[{35: [[23, 44, 49, 108, 140, 146], 0.012371134020618556, 0.04563562211274973]}, 3.6888794541139363]]

Token: [221] ||| Value: [[{35: [[47, 106, 138], 0.006185567010309278, 0.022817811056374863]}, 3.6888794541139363]]

Token: [year98] ||| Value: [[{35: [[48, 145], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [i.e] ||| Value: [[{35: [[59, 241], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [level\d] ||| Value: [[{35: [[66], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [i.e.] ||| Value: [[{35: [[72], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [221top\222] ||| Value: [[{35: [[158], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [\221top\222] ||| Value: [[{35: [[161, 164, 167], 0.006185567010309278, 0.022817811056374863]}, 3.6888794541139363]]

Token: [customer-bas] ||| Value: [[{35: [[170], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [4.3] ||| Value: [[{35: [[209], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [convert] ||| Value: [[{35: [[237], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [following cells] ||| Value: [[{35: [[247], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [cells CrossSales\] ||| Value: [[{35: [[248], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [CrossSales\ (] ||| Value: [[{35: [[249, 270, 392], 0.006185567010309278, 0.022817811056374863]}, 3.6888794541139363]]

Token: [\221B\222 ,] ||| Value: [[{35: [[255, 276, 398], 0.006185567010309278, 0.018530302723014376], 38: [[197], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [area \221] ||| Value: [[{35: [[263, 284], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [\221 California] ||| Value: [[{35: [[264, 285], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [California 222] ||| Value: [[{35: [[265, 286, 350, 382], 0.008247422680412371, 0.030423748075166485]}, 3.6888794541139363]]

Token: [222 ,] ||| Value: [[{35: [[266, 287, 351, 383], 0.008247422680412371, 0.030423748075166485]}, 3.6888794541139363]]

Token: [221Jan98\222 CrossSales\] ||| Value: [[{35: [[269], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [time 221] ||| Value: [[{35: [[289], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [221 Year98] ||| Value: [[{35: [[290], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [Year98 222] ||| Value: [[{35: [[291, 388], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [222 represent] ||| Value: [[{35: [[292], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [represent association] ||| Value: [[{35: [[293], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [rules at] ||| Value: [[{35: [[295], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [at different] ||| Value: [[{35: [[296], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [different area] ||| Value: [[{35: [[297], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [area levels] ||| Value: [[{35: [[298], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [levels \] ||| Value: [[{35: [[299, 312], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [( i.e] ||| Value: [[{35: [[301], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [i.e the] ||| Value: [[{35: [[302], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [the city] ||| Value: [[{35: [[303], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [city level] ||| Value: [[{35: [[304], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [state level\d] ||| Value: [[{35: [[308], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [level\d different] ||| Value: [[{35: [[309], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [time levels] ||| Value: [[{35: [[311], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [( i.e.] ||| Value: [[{35: [[314], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [i.e. ,] ||| Value: [[{35: [[315], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [year level] ||| Value: [[{35: [[322], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [level x] ||| Value: [[{35: [[323], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [area 221] ||| Value: [[{35: [[348, 380], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [221 California] ||| Value: [[{35: [[349, 381], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [\221Jan98\222 x] ||| Value: [[{35: [[355], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [= \221] ||| Value: [[{35: [[386], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [\221 Year98] ||| Value: [[{35: [[387], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [222 The] ||| Value: [[{35: [[389], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [cell CrossSales\] ||| Value: [[{35: [[391], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [customer\_group 221top\222] ||| Value: [[{35: [[400], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [221top\222 ,] ||| Value: [[{35: [[401], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [merchant \221top\222] ||| Value: [[{35: [[403], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [\221top\222 ,] ||| Value: [[{35: [[404, 407], 0.004123711340206186, 0.015211874037583242]}, 3.6888794541139363]]

Token: [area \221top\222] ||| Value: [[{35: [[406], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [time \221top\222] ||| Value: [[{35: [[409], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [\221top\222 represents] ||| Value: [[{35: [[410], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [the customer-based] ||| Value: [[{35: [[412], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [customer-based cross-sale] ||| Value: [[{35: [[413], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [rule for] ||| Value: [[{35: [[416], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [all customers] ||| Value: [[{35: [[418], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [customers ,] ||| Value: [[{35: [[419], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [, merchants] ||| Value: [[{35: [[420], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [merchants ,] ||| Value: [[{35: [[421], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [, areas] ||| Value: [[{35: [[422], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [and times] ||| Value: [[{35: [[425], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [times in] ||| Value: [[{35: [[426], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [given range] ||| Value: [[{35: [[429], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [range of] ||| Value: [[{35: [[430], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [these dimensions] ||| Value: [[{35: [[432], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [, expressed] ||| Value: [[{35: [[434], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [expressed as] ||| Value: [[{35: [[435], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [as x] ||| Value: [[{35: [[436], 0.002061855670103093, 0.006176767574338125], 38: [[178], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [\221B\222 4.3] ||| Value: [[{35: [[451], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [4.3 Generating] ||| Value: [[{35: [[452], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [Generating Association] ||| Value: [[{35: [[453], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [Rule Related] ||| Value: [[{35: [[455], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [Related Cubes] ||| Value: [[{35: [[456], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [Cubes The] ||| Value: [[{35: [[457], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [The basic] ||| Value: [[{35: [[458], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [basic task] ||| Value: [[{35: [[459], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [task of] ||| Value: [[{35: [[460], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [of our] ||| Value: [[{35: [[461], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [our OLAP] ||| Value: [[{35: [[462], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [OLAP based] ||| Value: [[{35: [[463], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [based association] ||| Value: [[{35: [[464], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [mining framework] ||| Value: [[{35: [[467], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [framework ,] ||| Value: [[{35: [[468], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [, either] ||| Value: [[{35: [[469], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [either at] ||| Value: [[{35: [[470], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [GDOS or] ||| Value: [[{35: [[473], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [or at] ||| Value: [[{35: [[474], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [at an] ||| Value: [[{35: [[475], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [an LDOS] ||| Value: [[{35: [[476], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [LDOS is] ||| Value: [[{35: [[477], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [to convert] ||| Value: [[{35: [[479], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [convert a] ||| Value: [[{35: [[480], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [a volume] ||| Value: [[{35: [[481], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [cube i.e] ||| Value: [[{35: [[483], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [i.e .] ||| Value: [[{35: [[484], 0.002061855670103093, 0.007605937018791621]}, 3.6888794541139363]]

Token: [purchas] ||| Value: [[{36: [[4], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [the cube] ||| Value: [[{36: [[45], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [cube representing] ||| Value: [[{36: [[46], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [representing the] ||| Value: [[{36: [[47], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [the purchase] ||| Value: [[{36: [[48], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [purchase volumes] ||| Value: [[{36: [[49], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [volumes of] ||| Value: [[{36: [[50], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [customers dimensioned] ||| Value: [[{36: [[52], 0.011235955056179775, 0.033659913185999896], 37: [[204], 0.003236245954692557, 0.00969492645163104]}, 2.995732273553991]]

Token: [by product] ||| Value: [[{36: [[54], 0.011235955056179775, 0.033659913185999896], 37: [[265, 277], 0.006472491909385114, 0.01938985290326208]}, 2.995732273553991]]

Token: [product area] ||| Value: [[{36: [[55], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [area etc] ||| Value: [[{36: [[56], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [etc ,] ||| Value: [[{36: [[57], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [, into] ||| Value: [[{36: [[58], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [into an] ||| Value: [[{36: [[59], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [cube a] ||| Value: [[{36: [[62], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [a base] ||| Value: [[{36: [[63], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [a population] ||| Value: [[{36: [[67], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [cube These] ||| Value: [[{36: [[69], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [These cubes] ||| Value: [[{36: [[70], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [cubes are] ||| Value: [[{36: [[71], 0.011235955056179775, 0.033659913185999896], 39: [[209], 0.004608294930875576, 0.01380521785047922]}, 2.995732273553991]]

Token: [then used] ||| Value: [[{36: [[73], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [to derive] ||| Value: [[{36: [[75], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [derive the] ||| Value: [[{36: [[76], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [the support] ||| Value: [[{36: [[81], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [cube of] ||| Value: [[{36: [[83], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [of multidimensional] ||| Value: [[{36: [[84], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [instances .] ||| Value: [[{36: [[88], 0.011235955056179775, 0.04144808375408917]}, 3.6888794541139363]]

Token: [involv] ||| Value: [[{37: [[5], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [roll] ||| Value: [[{37: [[12], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [numofbuy] ||| Value: [[{37: [[31, 99, 119], 0.009708737864077669, 0.035814363632174134]}, 3.6888794541139363]]

Token: [numofshopp] ||| Value: [[{37: [[44, 103, 130], 0.009708737864077669, 0.035814363632174134]}, 3.6888794541139363]]

Token: [product\at] ||| Value: [[{37: [[58], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cell-wis] ||| Value: [[{37: [[93], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [exceed] ||| Value: [[{37: [[146], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [threshold] ||| Value: [[{37: [[148], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [4.4] ||| Value: [[{37: [[153], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [following general] ||| Value: [[{37: [[156], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [general steps] ||| Value: [[{37: [[157], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [steps are] ||| Value: [[{37: [[158], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [are involved] ||| Value: [[{37: [[159], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [involved in] ||| Value: [[{37: [[160], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [in cross-sale] ||| Value: [[{37: [[161], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [mining 267] ||| Value: [[{37: [[165], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [267 Roll] ||| Value: [[{37: [[166], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Roll up] ||| Value: [[{37: [[167], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cube SaleUnits] ||| Value: [[{37: [[171], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [SaleUnits by] ||| Value: [[{37: [[172], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [by aggregating] ||| Value: [[{37: [[173], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [aggregating it] ||| Value: [[{37: [[174], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [it along] ||| Value: [[{37: [[175], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [along merchant] ||| Value: [[{37: [[176], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [area dimensions] ||| Value: [[{37: [[181], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [dimensions 267] ||| Value: [[{37: [[182], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [267 Derive] ||| Value: [[{37: [[183, 218, 240], 0.009708737864077669, 0.035814363632174134]}, 3.6888794541139363]]

Token: [Derive cube] ||| Value: [[{37: [[184, 219, 241], 0.009708737864077669, 0.035814363632174134]}, 3.6888794541139363]]

Token: [cube NumOfBuyers] ||| Value: [[{37: [[185], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfBuyers from] ||| Value: [[{37: [[186], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [from SaleUnits] ||| Value: [[{37: [[187, 222], 0.006472491909385114, 0.023876242421449426]}, 3.6888794541139363]]

Token: [SaleUnits based] ||| Value: [[{37: [[188, 223], 0.006472491909385114, 0.023876242421449426]}, 3.6888794541139363]]

Token: [condition SaleUnits] ||| Value: [[{37: [[193], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [SaleUnits 0] ||| Value: [[{37: [[194], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [0 267] ||| Value: [[{37: [[195, 239], 0.006472491909385114, 0.023876242421449426]}, 3.6888794541139363]]

Token: [267 Populate] ||| Value: [[{37: [[196], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Populate cube] ||| Value: [[{37: [[197], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cube NumOfShoppers] ||| Value: [[{37: [[198], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfShoppers by] ||| Value: [[{37: [[199], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [the counts] ||| Value: [[{37: [[201], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [by merchant] ||| Value: [[{37: [[206], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [area time] ||| Value: [[{37: [[209], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [time not] ||| Value: [[{37: [[210], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [not by] ||| Value: [[{37: [[211], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [by product\at] ||| Value: [[{37: [[212], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [product\at satisfy] ||| Value: [[{37: [[213], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [satisfy the] ||| Value: [[{37: [[214], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [antecedent conditions] ||| Value: [[{37: [[216], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [conditions 267] ||| Value: [[{37: [[217], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [CrossSales from] ||| Value: [[{37: [[221], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [association conditions] ||| Value: [[{37: [[227], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [conditions SaleUnits] ||| Value: [[{37: [[228], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cube Confidence] ||| Value: [[{37: [[242], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Confidence and] ||| Value: [[{37: [[243], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [and cube] ||| Value: [[{37: [[244], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cube Support] ||| Value: [[{37: [[245], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Support using] ||| Value: [[{37: [[246], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [using cell-wise] ||| Value: [[{37: [[247], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [cell-wise operations] ||| Value: [[{37: [[248], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [operations 214] ||| Value: [[{37: [[249], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [214 Confidence] ||| Value: [[{37: [[250], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Confidence =] ||| Value: [[{37: [[251], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [= CrossSales] ||| Value: [[{37: [[252], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [CrossSales NumOfBuyers] ||| Value: [[{37: [[253], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfBuyers 214] ||| Value: [[{37: [[254], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [214 Support] ||| Value: [[{37: [[255], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Support CrossSales] ||| Value: [[{37: [[256, 261], 0.006472491909385114, 0.023876242421449426]}, 3.6888794541139363]]

Token: [CrossSales NumOfShoppers] ||| Value: [[{37: [[257], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfShoppers Cubes] ||| Value: [[{37: [[258], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Cubes Confidence] ||| Value: [[{37: [[259], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Confidence Support] ||| Value: [[{37: [[260], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [CrossSales are] ||| Value: [[{37: [[262], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [are dimensioned] ||| Value: [[{37: [[263], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [product product2] ||| Value: [[{37: [[266], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [product2 customer\_group] ||| Value: [[{37: [[267], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [area NumOfBuyers] ||| Value: [[{37: [[273], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfBuyers is] ||| Value: [[{37: [[274], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [product customer\_group] ||| Value: [[{37: [[278], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [area NumOfShoppers] ||| Value: [[{37: [[284], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [NumOfShoppers is] ||| Value: [[{37: [[285], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [by customer\_group] ||| Value: [[{37: [[288], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [area Rules] ||| Value: [[{37: [[294], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [Rules with] ||| Value: [[{37: [[295], 0.003236245954692557, 0.00969492645163104], 38: [[142], 0.0035335689045936395, 0.01058562640831799]}, 2.995732273553991]]

Token: [with confidence] ||| Value: [[{37: [[296], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [support that] ||| Value: [[{37: [[299], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [that exceed] ||| Value: [[{37: [[300], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [exceed specified] ||| Value: [[{37: [[301], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [specified thresholds] ||| Value: [[{37: [[302], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [thresholds may] ||| Value: [[{37: [[303], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [be considered] ||| Value: [[{37: [[305], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [considered interesting] ||| Value: [[{37: [[306], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [interesting 4.4] ||| Value: [[{37: [[307], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [4.4 .] ||| Value: [[{37: [[308], 0.003236245954692557, 0.011938121210724713]}, 3.6888794541139363]]

Token: [time-vari] ||| Value: [[{38: [[30], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [a\222] ||| Value: [[{38: [[45], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [jan98\222] ||| Value: [[{38: [[48], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\_product\] ||| Value: [[{38: [[51], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [feb98\222] ||| Value: [[{38: [[58], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\223] ||| Value: [[{38: [[72], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [sale] ||| Value: [[{38: [[76, 84], 0.007067137809187279, 0.02606981946370273]}, 3.6888794541139363]]

Token: [224] ||| Value: [[{38: [[89], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [pair] ||| Value: [[{38: [[97], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [kind] ||| Value: [[{38: [[108], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [mirror] ||| Value: [[{38: [[121], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [cross] ||| Value: [[{38: [[137], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [with Conjoint] ||| Value: [[{38: [[143], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Conjoint Items] ||| Value: [[{38: [[144], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Items Cubes] ||| Value: [[{38: [[145], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Cubes with] ||| Value: [[{38: [[146], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [dimensions can] ||| Value: [[{38: [[149], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [to represent] ||| Value: [[{38: [[153], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [represent refined] ||| Value: [[{38: [[154], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [refined multidimensional] ||| Value: [[{38: [[155], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [rules For] ||| Value: [[{38: [[158], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [, using] ||| Value: [[{38: [[161], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [using OLAP] ||| Value: [[{38: [[162], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [OLAP ,] ||| Value: [[{38: [[163], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [we can] ||| Value: [[{38: [[165], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [can derive] ||| Value: [[{38: [[166], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [derive association] ||| Value: [[{38: [[167], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [rules across] ||| Value: [[{38: [[169], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [across time] ||| Value: [[{38: [[170], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [time Time-variant] ||| Value: [[{38: [[171], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Time-variant or] ||| Value: [[{38: [[172], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [or temporal] ||| Value: [[{38: [[173], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [temporal association] ||| Value: [[{38: [[174], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [rules such] ||| Value: [[{38: [[176], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Customers buy\_product\] ||| Value: [[{38: [[181], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\222 A\222] ||| Value: [[{38: [[186], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [A\222 ,] ||| Value: [[{38: [[187], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [, \221] ||| Value: [[{38: [[188, 198], 0.007067137809187279, 0.02606981946370273]}, 3.6888794541139363]]

Token: [\221 Jan98\222] ||| Value: [[{38: [[189], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Jan98\222 336] ||| Value: [[{38: [[190], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [336 buy] ||| Value: [[{38: [[191], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [buy \_product\] ||| Value: [[{38: [[192], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\_product\ (] ||| Value: [[{38: [[193], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\221 Feb98\222] ||| Value: [[{38: [[199], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Feb98\222 275] ||| Value: [[{38: [[200], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [= \221Los] ||| Value: [[{38: [[203], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Angeles\222 can] ||| Value: [[{38: [[205], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [answer such] ||| Value: [[{38: [[210], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [such questions] ||| Value: [[{38: [[211], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [questions as] ||| Value: [[{38: [[212], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [as \223] ||| Value: [[{38: [[213], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [\223 How] ||| Value: [[{38: [[214], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [How are] ||| Value: [[{38: [[215], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [the sales] ||| Value: [[{38: [[217, 225], 0.007067137809187279, 0.02606981946370273]}, 3.6888794541139363]]

Token: [sales of] ||| Value: [[{38: [[218, 226], 0.007067137809187279, 0.02606981946370273]}, 3.6888794541139363]]

Token: [of B] ||| Value: [[{38: [[219], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [in Feb98] ||| Value: [[{38: [[221], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Feb98 associated] ||| Value: [[{38: [[222], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [associated with] ||| Value: [[{38: [[223], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [of A] ||| Value: [[{38: [[227], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [A in] ||| Value: [[{38: [[228], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [in Jan98] ||| Value: [[{38: [[229], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [Jan98 224] ||| Value: [[{38: [[230], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [224 The] ||| Value: [[{38: [[231], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [The items] ||| Value: [[{38: [[232], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [rule are] ||| Value: [[{38: [[236], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [are value] ||| Value: [[{38: [[237], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [value pairs] ||| Value: [[{38: [[238], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [pairs of] ||| Value: [[{38: [[239], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [of dimensions] ||| Value: [[{38: [[240], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [dimensions product] ||| Value: [[{38: [[241], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [product and] ||| Value: [[{38: [[242], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [and time] ||| Value: [[{38: [[243], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [time In] ||| Value: [[{38: [[244], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [specify this] ||| Value: [[{38: [[248], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [this kind] ||| Value: [[{38: [[249], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [kind of] ||| Value: [[{38: [[250], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [rule we] ||| Value: [[{38: [[253], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [we introduce] ||| Value: [[{38: [[254], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [a conjoint] ||| Value: [[{38: [[256], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [conjoint dimension] ||| Value: [[{38: [[257], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [dimension product] ||| Value: [[{38: [[258], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [and mirror] ||| Value: [[{38: [[262], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [mirror it] ||| Value: [[{38: [[263], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [it with] ||| Value: [[{38: [[264], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [with dimension] ||| Value: [[{38: [[265], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [dimension product2] ||| Value: [[{38: [[266], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [time2 This] ||| Value: [[{38: [[269], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [This allows] ||| Value: [[{38: [[270], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [allows a] ||| Value: [[{38: [[271], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [cube to] ||| Value: [[{38: [[277], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [to cross] ||| Value: [[{38: [[278], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [cross two] ||| Value: [[{38: [[279], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [two time] ||| Value: [[{38: [[280], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [time values] ||| Value: [[{38: [[281], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [values .] ||| Value: [[{38: [[282], 0.0035335689045936395, 0.013034909731851365]}, 3.6888794541139363]]

Token: [accordingli] ||| Value: [[{39: [[0], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [numofbuyers.2] ||| Value: [[{39: [[35], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [numofshoppers.2] ||| Value: [[{39: [[50], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [confidence.2] ||| Value: [[{39: [[60], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [support.2] ||| Value: [[{39: [[80], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [Accordingly ,] ||| Value: [[{39: [[109], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cubes related] ||| Value: [[{39: [[112], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [mining are] ||| Value: [[{39: [[117], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [are defined] ||| Value: [[{39: [[118], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [as follows] ||| Value: [[{39: [[120], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [follows Association] ||| Value: [[{39: [[121], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cube CrossSales.2] ||| Value: [[{39: [[123], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [CrossSales.2 \] ||| Value: [[{39: [[124], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [< product] ||| Value: [[{39: [[127, 147, 172], 0.013824884792626729, 0.05099833346701295]}, 3.6888794541139363]]

Token: [time >] ||| Value: [[{39: [[130, 150, 175, 192], 0.018433179723502304, 0.06799777795601726]}, 3.6888794541139363]]

Token: [< product2] ||| Value: [[{39: [[133, 178, 195], 0.013824884792626729, 0.05099833346701295]}, 3.6888794541139363]]

Token: [time2 customer\_group] ||| Value: [[{39: [[136, 181, 198], 0.013824884792626729, 0.05099833346701295]}, 3.6888794541139363]]

Token: [area Population] ||| Value: [[{39: [[141], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cube NumOfBuyers.2] ||| Value: [[{39: [[143], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [NumOfBuyers.2 \] ||| Value: [[{39: [[144], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cube NumOfShoppers.2] ||| Value: [[{39: [[158], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [NumOfShoppers.2 \] ||| Value: [[{39: [[159], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cube Confidence.2] ||| Value: [[{39: [[168], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [Confidence.2 \] ||| Value: [[{39: [[169], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [area Support] ||| Value: [[{39: [[186], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [cube Support.2] ||| Value: [[{39: [[188], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [Support.2 product] ||| Value: [[{39: [[189], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [area The] ||| Value: [[{39: [[203], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [The steps] ||| Value: [[{39: [[204], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [steps for] ||| Value: [[{39: [[205], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [for generating] ||| Value: [[{39: [[206], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [generating these] ||| Value: [[{39: [[207], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [are similar] ||| Value: [[{39: [[210], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [similar to] ||| Value: [[{39: [[211], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [the ones] ||| Value: [[{39: [[213], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [ones described] ||| Value: [[{39: [[214], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [described before] ||| Value: [[{39: [[215], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

Token: [before .] ||| Value: [[{39: [[216], 0.004608294930875576, 0.016999444489004315]}, 3.6888794541139363]]

**The Max Gap is : 0.017135945243**

Keywords are :

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of people

who buy

buy a

a printer

they bought

bought a

a PC

PC x

x 316

316 Customer

buy\_product\ (

( x

x ,

, \221PC\222

\221PC\222 ,

, a\_

336 buy\_product\

, \221printer\222

\221printer\222 ,

275 area

area =

= \221California\222

Customer :

instance association

, \222

variant ,

be derived

let

us

time\_delta

one\_day

two\_day

205

day

one\_month

two\_month

\205

Let us

us introduce

introduce a

new dimension

dimension time\_delta

time\_delta that

that has

has values

values one\_day

one\_day ,

, two\_day

two\_day 205

205 ,

the day

day level

and values

values one\_month

one\_month ,

, two\_month

two\_month ,

, \205

\205 ,

the month

month level

, etc

etc .

crosssales.3

customer\_group

merchant

support

count

<

>

distribut

increment

267

dynam

e-commerc

warehous

transact

( product

, customer\_group

merchant ,

, area

area ,

, time\_delta

customer\_group ,

, merchant

cells of

( <

PC ,

> ,

, <

Rule Mining

is ,

mine association

data warehouse

flow

daili

223real-time\224

drawn

latest

commerci

trend

multilevel

summar

The data

data flows

flows in

in continuously

continuously and

and is

is processed

processed daily

daily Mining

Mining association

rules dynamically

dynamically has

following benefits

benefits 267

267 223Real-time\224

223Real-time\224 data

data mining

mining ,

, that

are drawn

drawn from

the latest

latest transactions

transactions for

for reflecting

the current

current commercial

commercial trends

trends 267

267 Multilevel

Multilevel knowledge

knowledge abstraction

abstraction ,

, which

which requires

requires summarizing

summarizing multiple

multiple partial

partial results

results .

basi

example association

rules on

month or

or year

year basis

basis can

be concluded

concluded from

from daily

daily mining

mining results

fact

In fact

fact multilevel

multilevel mining

mining is

is incremental

incremental in

in nature

nature 267

267 For

For scalability

scalability ,

, incremental

incremental and

and distributed

distributed mining

mining has

has become

become a

a practical

practical choice

choice Figure

3 :

: Distributed

Distributed rule

rule mining

mining Incremental

Incremental association

mining requires

requires combining

combining partial

is easy

easy to

see that

the confidence

confidence and

and support

support of

of multiple

multiple rules

may not

be combined

combined directly

directly .

whi

treat

them

\223views\224

updat

copi

is why

why we

we treat

treat them

them as

as \223views\224

\223views\224 and

and only

only maintain

maintain the

cube ,

the population

base cube

cube that

that can

be updated

updated from

from each

each new

new copy

copy of

of volume

cube .

slice

list

repres

hierarch

The slices

slices of

of these

these cubes

cubes shown

2 correspond

same list

list of

in dimension

dimension merchant

time ,

area and

and customer\_group

customer\_group Multidimensional

Multidimensional and

and multilevel

multilevel rules

rules Representing

Representing association

rules by

by cubes

cubes and

and underlying

underlying cubes

cubes by

by hierarchical

hierarchical dimensions

dimensions ,

, naturally

naturally supports

supports multidimensional

multidimensional and

rules .

below

gdo

ldoss

sum

volume-cub

Below ,

we discuss

discuss several

several cases

cases to

to show

how a

a GDOS

GDOS can

can mine

by incorporating

incorporating the

the partial

results computed

computed at

at LDOSs

LDOSs 267

267 The

first case

case is

to sum

sum up

up volume-cubes

volume-cubes generated

generated at

at multiple

multiple LDOSs

LDOSs .

i

ldo

fed

345

central

214

local

particip

b

Let C

C v

v ,

, i

i be

the volume-cube

volume-cube generated

at LDOS

LDOS i

i The

The volume-cube

the GDOS

GDOS by

by combining

combining the

the volume-cubes

volume-cubes fed

fed from

from these

these LDOSs

LDOSs is

is 345

345 n

n i

i i

v v

v C

C C

C 1

1 The

are then

then generated

GDOS from

the centralized

centralized C

v 214

214 The

second case

to mine

mine local

local rules

rules with

with distinct

distinct bases

bases at

at participating

participating LDOSs

LDOSs ,

, resulting

a local

local association

cube C

C a

a ,

, I

I a

local population

C p

p ,

I and

local base

C b

b ,

i at

at each

each LDOS

LDOS .

sent

earlier

GDOS ,

, multiple

multiple association

association cubes

cubes ,

, population

population cubes

and base

base cubes

cubes sent

sent from

the LDOSs

LDOSs are

are simply

simply combined

combined ,

a summarized

summarized association

summarized population

, as

as 345

i a

a a

a C

1 345

i p

p p

p C

1 and

and 345

i b

b b

b C

The corresponding

corresponding confidence

confidence cube

support cube

cube can

can then

derived as

as described

described earlier

earlier .

cross-sal

cover

doe

TV

dept

store

98q1

vcr

francisco

jose

a 1

1 205

a k

of customers

customer product

product merchant

merchant time

time area

area Doe

Doe TV

Dept Store

Store 98Q1

98Q1 California

Doe VCR

San Francisco

San Jose

cube cube

seen

citi

This can

be seen

seen in

following examples

examples 214

214 A

A customer

customer who

who bought

bought A

and B

B in

in both

both San

Jose and

and San

Francisco which

are covered

covered by

by different

different LDOSs

, contributes

contributes a

a count

count to

rule covering

covering each

each city

city ,

but has

has only

only one

one count

count ,

, not

not two

two ,

rule A

A 336

336 B

B covering

covering California

California 214

customer \

( e.g

e.g .

3\who

countabl

Doe in

Figure 3\who

3\who bought

a TV

TV in

in San

Jose ,

but a

a VCR

VCR in

Francisco ,

, is

not countable

countable for

the cross-sale

cross-sale association

rule TV

TV 336

336 VCR

VCR covering

covering any

any of

these cities

cities ,

but countable

California .

illustr

scale-up

ecommerc

cooper

data-warehouse/olap

infrastructur

is illustrated

illustrated in

3 6

6 Conclusions

Conclusions In

to scale-up

scale-up association

mining in

in ecommerce

ecommerce ,

have developed

developed a

a distributed

distributed and

and cooperative

cooperative data-warehouse/OLAP

data-warehouse/OLAP infrastructure

infrastructure .

enhanc

discret

activ

geograph

period

This infrastructure

infrastructure allows

allows us

us to

to generate

generate association

with enhanced

enhanced expressive

expressive power

power ,

, by

combining information

information of

of discrete

discrete commercial

commercial activities

activities from

from different

different geographic

geographic areas

areas ,

, different

different merchants

merchants and

and over

over different

different time

time periods

periods .

scope

item

extens

propos

HP

lab

busi

paper we

have introduced

introduced scoped

scoped association

rules association

with conjoint

conjoint items

items and

and functional

rules as

as useful

useful extensions

extensions to

to association

rules The

The proposed

proposed infrastructure

infrastructure has

been designed

designed and

and prototyped

prototyped at

at HP

HP Labs

Labs to

to support

support business

business intelligence

intelligence applications

applications in

in e-commerce

e-commerce .

preliminari

valid

Our preliminary

preliminary results

results validate

validate the

the scalability

scalability and

and maintainability

maintainability of

this infrastructure

infrastructure ,

power of

the enhanced

enhanced multilevel

multilevel and

and multidimensional

organ

easili

Also these

these rules

are well

well organized

organized and

and can

be easily

easily queried

queried First

the cells

an association

cube with

with different

different dimension

dimension values

values are

are related

related to

rule instances

instances in

in different

different scopes

scopes .

privaci

profil

p3p

protocol

[

ou

we did

not discuss

discuss privacy

privacy control

control in

in customer

customer profiling

profiling However

did address

address this

this issue

issue in

in our

our design

design by

incorporating support

support for

the P3P

P3P protocol

protocol [

[ 1

1 i

i n

n ou

ou r

r data

warehouse .

plan

sameet

agarw

rakesh

agraw

prasad

deshpand

ashish

gupta

jeffrey

F.

naughton

raghu

sunita

sarawagi

506-521

proc

We plan

plan to

integrate this

this framework

framework with

a commercial

commercial e-commerce

e-commerce system

system References

References 1

1 Sameet

Sameet Agarwal

Agarwal ,

, Rakesh

Rakesh Agrawal

Agrawal ,

, Prasad

Prasad Deshpande

Deshpande Ashish

Ashish Gupta

Gupta ,

, Jeffrey

Jeffrey F.

F. Naughton

Naughton ,

, Raghu

Raghu Ramakrishnan

Ramakrishnan ,

, Sunita

Sunita Sarawagi

Sarawagi ,

`` On

On the

the Computation

Computation of

of Multidimensional

Multidimensional Aggregates

Aggregates ''

'' ,

, 506-521

506-521 ,

, Proc

Proc .

vldb'96

surajit

chaudhuri

umesh

dayal

\223an

overview

wareh

olap

technology\224

vol

26\

No

1\

qime

chen

meichun

hsu

223

olapbas

behavior\224

VLDB'96 1996

1996 2

2 Surajit

Surajit Chaudhuri

Chaudhuri and

and Umesh

Umesh Dayal

Dayal ,

, \223An

\223An Overview

Overview of

Data Warehousing

Warehousing and

and OLAP

OLAP Technology\224

Technology\224 ,

, SIGMOD

SIGMOD Record

Record Vol

Vol \

( 26\

26\ No

No \

( 1\

1\ 1996

1996 3

3 Qiming

Qiming Chen

Chen ,

, Umesh

, Meichun

Meichun Hsu

Hsu 223

223 OLAPbased

OLAPbased Scalable

Scalable Profiling

Profiling of

of Customer

Customer Behavior\224

Behavior\224 ,

Of

st

dawak99\

itali

hector

garcia-molina

wilburt

labio

jun

yang

expir

Of 1

1 st

st International

on Data

and Knowledge

Discovery \

( DAWAK99\

DAWAK99\ ,

, 1999

1999 ,

, Italy

Italy 4

4 Hector

Hector Garcia-Molina

Garcia-Molina ,

, Wilburt

Wilburt Labio

Labio ,

, Jun

Jun Yang

Yang Expiring

Expiring Data

Data in

a Warehouse

Warehouse ''

vldb'98

1998

J.

han

S.

chee

Y.

chiang

on-lin

analyt

sigmod'98

dmkd'98\

VLDB'98 ,

, 1998

1998 5

5 J.

J. Han

Han ,

, S.

S. Chee

Chee ,

and J.

J. Y.

Y. Chiang

Chiang ,

`` Issues

Issues for

for On-Line

On-Line Analytical

Analytical Mining

Mining of

Data Warehouses

Warehouses ''

, SIGMOD'98

SIGMOD'98 Workshop

on Research

Research Issues

Issues on

Data Mining

Mining and

( DMKD'98\

DMKD'98\ ,

, USA

USA ,

1998 6

6 J.

`` OLAP

OLAP Mining

Mining :

: An

An Integration

Integration of

of OLAP

OLAP with

with Data

Mining ''

ifip

semant

ds-7\

switzerland

raymond

T.

Ng

lak

v.

IFIP Conference

Data Semantics

Semantics DS-7\

DS-7\ ,

, Switzerland

Switzerland ,

, 1997

1997 7

7 Raymond

Raymond T.

T. Ng

Ng ,

, Laks

Laks V.S

V.S .

lakshmanan

jiawei

alex

pang

exploratori

prune

constrain

acm-sigmod'98

torben

bach

pedersen

christian

jensen

Lakshmanan ,

, Jiawei

Jiawei Han

Han Alex

Alex Pang

Pang ,

`` Exploratory

Exploratory Mining

and Pruning

Pruning Optimizations

Optimizations of

of Constrained

Constrained Associations

Associations Rules

Rules ''

Proc ACM-SIGMOD'98

ACM-SIGMOD'98 ,

1998 8

8 Torben

Torben Bach

Bach Pedersen

Pedersen ,

, Christian

Christian S.

S. Jensen

Jensen Multidimensional

Multidimensional Data

Data Modeling

Modeling for

for Complex

Complex Data

Data Proc

icde'99

shibi

thoma

hannu

toivonen

134-145

ICDE'99 ,

1999 9

9 Sunita

, Shiby

Shiby Thomas

Thomas ,

Agrawal Integrating

Integrating Association

Association Rule

Mining with

with Relational

Relational Database

Database Systems

Systems :

: Alternatives

Alternatives and

and Implications

Implications ''

1998 Hannu

Hannu Toivonen

Toivonen ,

`` Sampling

Sampling Large

Large Databases

Databases for

for Association

, 134-145

134-145 ,

dick

tsur

D.

ullman

serg

abiteboul

chri

clifton

rajeev

motwani

svetlozar

nestorov

arnon

rosenth

flock

association-rul

VLDB'96 ,

, 1996

1996 Dick

Dick Tsur

Tsur ,

Jeffrey D.

D. Ullman

Ullman ,

, Serge

Serge Abiteboul

Abiteboul ,

, Chris

Chris Clifton

Clifton ,

, Rajeev

Rajeev Motwani

Motwani ,

, Svetlozar

Svetlozar Nestorov

Nestorov ,

, Arnon

Arnon Rosenthal

Rosenthal ,

`` Query

Query Flocks

Flocks :

: A

A Generalization

Generalization of

of Association-Rule

Association-Rule Mining

'' Proc

crosssal

\221a\222

\221b\222

\221sears\222

angeles\222

221lo

4500

10000

0.45

multi-level

CrossSales cell

cell CrossSales

CrossSales product

product \221A\222

\221A\222 ,

product2 \221B\222

\221B\222 customer\_group

\221Sears\222 ,

area \221Los

Angeles\222 ,

221Jan98\222 represents

following multidimensional

multidimensional rule

rule x

Customers :

, \221A\222

\221A\222 336

area 221Los

221Los Angeles\222

\221Jan98\222 If

If this

this cell

cell has

has value

value 4500

4500 ,

corresponding cell

cube has

value 10000

10000 ,

, then

then this

rule has

has confidence

confidence 0.45

0.45 Next

Next as

cubes representing

representing rules

have hierarchical

, they

they represent

represent not

only multidimensional

multidimensional but

but also

also multi-level

multi-level association

crosssales\

\221

222

221

\221top\222

CrossSales\ (

\221B\222 ,

California 222

222 ,

purchas

the cube

cube representing

representing the

the purchase

purchase volumes

volumes of

customers dimensioned

by product

product area

area etc

etc ,

, into

into an

cube a

a base

a population

cube These

These cubes

cubes are

then used

to derive

derive the

the support

cube of

of multidimensional

instances .

numofbuy

numofshopp

267 Derive

Derive cube

from SaleUnits

SaleUnits based

0 267

Support CrossSales

sale

, \221

the sales

sales of

< product

time >

< product2

time2 customer\_group