Appendix: Additional Tables and Results

1 Comparison of Topic Labels Across Datasets

This appendix provides a detailed comparison of topic labels generated by different models and human annotators across multiple datasets. The tables below showcase the topics extracted from the datasets along with their corresponding labels assigned by three human annotators, GPT-4o, Llama 3.1 8B Instruct, Llama 3.2 3B Instruct, and BERTopic. These comparisons are intended to highlight the consistency and variance in topic labeling across different sources.

Table 1: Comparison of Topic Labels Generated by Humans and Models for BBC News Dataset

Topics	Human 1	Human 2	Human 3	GPT-4o	Llama 3.1 8B Instruct	Llama 3.2 3B Instruct	BERTopic
said, mr, would, government, labour, us, also, year, election, new, blair, people, minister, party, could	UK Election	UK General Election Cycle	Presidential Candidate's Opinions in UK	UK Politics and Government Leadership	UK General Election 2005	Tony Blair's Labour Government Election	Said Mr Would
club, chelsea, united, arsenal, liverpool, league, game, football, manager, manchester, said, cup, players, would, goal	Football (Soccer to Americans)	UK Football	Champions League	English Football Clubs and Competitions	Premier League Football News	English Premier League Football Match	Club Chelsea United
film, best, actor, films, director, awards, award, actress, oscar, festival, movie, aviator, said, year, star	Award Nominated Movies	Oscars Ceremony	Film Awards	Film Awards and Recognition	Oscar and Film Industry Recognition	Oscar-Winning Actor's Film Performance at Festival	Film Best Actor

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
england, wales, ireland, rugby, france, nations, six, game, side, coach, robinson, players, scotland, italy, first	Rugby Tournament	EU Sports	European Rugby League	Six Nations Rugby Championships	Six Nations Rugby Championships	Six Nations Cup	England Wales Ireland
music, band, album, song, best, number, rock, singer, chart, one, said, us, awards, top, pop	Popular Music	Music Awards	Music Genres	Music Industry and Chart-Topping Hits	Music Awards and Chart Performance	US Rock Singer's Number One Album	Music Band Album
open, roddick, seed, australian, match, set, win, nadal, tennis, first, 63, beat, hewitt, final, federer	Tennis Final	Australian Tennis	Tennis Tournament	Grand Slam Tennis Matches	Tennis: Australian Open Final	Roddick Beats Nadal in Australian Open Final	Open Roddick Seed
broadband, phone, mobile, people, phones, bt, said, net, tv, services, service, uk, digital, mobiles, million	Phone Service	Uk Communication	Telecom Services in the United Kingdom	UK Telecommunications and Digital Services	UK Digital Communications	UK Broadband and Mobile Services	Broadband Phone Mobile
security, virus, software, users, email, spam, microsoft, said, site, windows, net, attacks, viruses, data, spyware	Computer Virus and Malware Warning	Cybersecurity	Cybersecurity Threats and Software Protection	Cybersecurity Threats and Software Protection	Computer Security Threats	Microsoft Windows Security Threats	Security Virus Software
olympic, race, indoor, world, champion, holmes, championships, athens, european, radcliffe, marathon, 60m, title, record, best	Olympics Track and Field Events	Olympics Track and Field Events	Olympics Track and Field Events	Athletic and Track Championships	Track And Field Olympic Champions	Mo Farah	Olympic Race Indoor

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
games, game, gaming, nintendo, gamers, xbox, ds, video, sony, titles, console, play, said, halo, time	Video Games	Gaming Event	Video Games	Video Game Consoles and Gaming Industry	Video Game Industry	Video Games and Consoles	Games Game Gaming
show, tv, series, bbc, said, channel, comedy, television, audience, viewers, celebrity, us, also, programme, million	TV Shows	Television Topics	Television	Television Programming and Viewership	UK TV Comedy Programming	BBC Comedy Series	Show TV Series
music, files, digital, said, technology, p2p, players, bittorrent, filesharing, apple, networks, software, people, piracy, peertopeer	File Sharing Technology	Peer to Peer Music Sharing	Music File Transfer	Digital Music Piracy and File Sharing Technology	Digital Music Piracy and File Sharing Technology	Digital Music Piracy	Music Files Digital
gadgets, gadget, digital, technology, technologies, show, devices, people, electronics, sony, mobile, consumer, video, make, laptop	Consumer Technology	Technology Development	Electronic Technology	Consumer Electronics and Gadgets	Consumer Electronics and Gadgets	Consumer Electronics	Gadgets Gadget Digital
search, google, blogs, web, yahoo, blog, people, users, microsoft, jeeves, information, ask, desktop, said, internet	Internet Search and Information	Search Engines and Trends	Online Search Platforms	Search Engines and Online Information Platforms	Internet Search and Navigation	Google Search Engine and Online Search Trends	Search Google Blogs
kenteris, iaaf, thanou, greek, drugs, conte, athens, doping, test, tests, olympics, balco, athletes, athletics, banned	Doping Scandal	Olympics PED Use	Greek Olympians Caught Doping	Greek Athletes' Doping Scandal	Greek Athletes Embroiled in Doping Scandal	Athletics Doping Scandal	Kenteris Iaaf Thanou

Table 2: Comparison of Topic Labels Generated by Humans and Models for Arxiv Abstracts Dataset

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
mass, ray, energy, model, observations, data, 10, star, emission, high, observed, galaxies, stars, dark, solar	Astrophysics Research	Space Phenomena	Space Research and Observations	Astrophysical Observations and Modeling of Stellar and Galactic Phenomena	Dark Matter in Galaxy Evolution	Dark Matter and Dark Energy in Galaxy Observations	Mass Ray Energy
learning, data, training, based, model, neural, image, models, methods, performance, network, method, propose, images, deep	Neural Networks and DL Models	Deep Learning for Vision	Image Based Machine Learning	Deep Learning in Image Processing	Deep Learning Methods for Image Analysis	Deep Learning Methods for Image Data	Learning Data Training
spin, quantum, magnetic, graphene, phase, field, temperature, states, state, two, energy, electron, transition, density, model	Quantum Mechanics	Quantum Mechanics	Quantum Physics	Quantum Spin Dynamics in Magnetic Graphene Systems	Quantum Spin Dynamics in Magnetic Graphene Systems	Quantum Magnetism in Graphene	Spin Quantum Magnetic
group, graph, prove, algebra, groups, graphs, show, algebras, finite, number, let, paper, every, give, set	Abstract Mathematics	Theoretical Graph Study	Linear Algebra Structures	Algebraic Graph Theory	Finite Group Theory	Graph Theory	Group Graph Prove
theory, black, gauge, quark, hole, field, pi, string, brane, decays, qcd, scalar, theories, mass, two	Atomic Delay	Quantum Field Theory	String Theory	Quantum Field Theory and High Energy Physics	Quantum Field Theory of Quark and Scaler Particle Decays	Quantum Chromodynamics and Holographic Theories of Quark-Gluon Plasma	Theory Black Gauge

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
random, stochastic, time, model, networks, process, network, distribution, processes, probability, dynamics, show, results, study, two	Probabilistic Model	Statistical Analysis	Mathematics of Stochastic Dynamics	Stochastic Network Dynamics	Stochastic Network Dynamics and Processes	Stochastic Network Dynamics	Random Stochastic Time
solutions, equation, equations, prove, space, spaces, existence, paper, solution, boundary, infinity, problem, operator, type, case	Mathematics Equations Research	Mathematical Spaces Proof	Mathematical Proof of Existence	Mathematical Analysis of Partial Differential Equations	Existence of Solutions in Mathematical Spaces	Mathematical Solutions in Infinite Space	Solution Equation Equations
learning, algorithm, policy, control, problem, algorithms, reinforcement, agent, rl, optimal, optimization, agents, robot, based, reward	Policy Optimization in RL Algorithms	Agent Based Reinforcement Learning	Reinforcement Learning Algorithms	Reinforcement Learning and Optimal Control in Robotics	Reinforcement Learning Algorithms for Optimal Control	Reinforcement Learning and Control	Learning Algorithm Policy
method, numerical, problems, convergence, problem, methods, order, algorithm, convex, element, optimization, finite, linear, solution, error	Numeric Algorithms for Convergence	Convex Optimization Algorithms	Numerical Error Analysis	Numerical Optimization and Convergence Methods	Numerical Optimization Methods	Numerical Methods for Solving Linear Optimization Problems	Method Numerical Problems
quantum, classical, states, qubit, state, qubits, entanglement, algorithm, circuit, error, protocol, key, circuits, gates, qkd	Quantum Mechanics	Quantum Computing	Quantum Physics	Quantum Computing and Communication	Quantum Information Processing and Error Correction	Quantum Computing and Quantum Information Processing	Quantum Classical States
liquid, dynamics, model, phase, simulations, surface, stress, transition, granular, shear, two, energy, temperature, particles, fluid	Fluid Dynamics	Fluid Dynamics	Particle Dynamics and Fluid Systems	Granular Fluid Dynamics and Phase Transitions	Granular Fluid Dynamics Modeling	Granular Fluid Dynamics	Liquid Dynamics Model

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Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
channel, codes, mimo, interference, multiple, proposed, performance, rate, power, user, wireless, communication, paper, users, capacity	Wireless Transmission Technology	Interference and Performance Challenges in Wireless Communication	Wireless Communication Technology	Wireless Communication Systems and Performance Optimization	Wireless Communication Systems Optimization	Wireless Multiple Access Channel Capacity Optimization	Channel Codes MIMO
privacy, data, federated, blockchain, fl, performance, learning, network, security, based, paper, clients, model, private, attacks	Blockchain for Federated Learning	Blockchain for Federated Learning	Privacy and Security in Federated Learning	Federated Learning and Blockchain for Privacy and Security	Federated Learning Security and Privacy	Federated Learning on Private Data Networks with Blockchain-based Models to Enhance Security and Performance	Privacy Data Federated
optical, photon, quantum, mode, light, frequency, photonic, states, modes, nonlinear, two, phase, single, wave, state	Quantum Light	Quantum Optics and Wave Theory	Quantum Physics	Quantum Photonics and Optical Modes	Quantum Optical Wave States and Modes	Quantum Optics and Photonics	Optical Photon Quantum
regression, data, estimator, estimators, treatment, causal, estimation, distribution, model, bayesian, methods, inference, method, proposed, sample	Bayesian Regression Model	Statistical Methods for Causal Inference	Statistical Methods for Causal Inference	Causal Inference and Bayesian Regression Methods	Causal Inference Methods in Regression Analysis	Bayesian Causal Estimation	Regression Data Estimator
plasma, turbulence, flow, turbulent, magnetic, velocity, field, reynolds, simulations, energy, scale, fluid, plasmas, numerical, flows	Plasma Dynamics	Magnetics and Plasma Turbulence	Plasma Physics and Fluid Turbulence	Plasma Turbulence and Fluid Dynamics	Plasma Turbulent Flow Dynamics	Turbulence in Magnetized Plasmas	Plasma Turbulence Flow

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
software, code, students, research, ai, development, learning, based, data, citation, paper, developers, process, science, study	AI Research Development	Emerging AI in Software Development	AI-Driven Software Engineering	AI-Driven Educational Software Development	Software Development for AI Research and Education	Artificial Intelligence and Machine Learning in Software Development	Software Code Students
clustering, data, algorithm, tree, phylogenetic, trees, hashing, algorithms, time, problem, based, persistence, methods, distance, space	Cluster Model and Tree Based Methods	Tree Based Algorithm	Phylogenetic Clustering Algorithms	Phylogenetic Clustering and Hashing Algorithms	Phylogenetic Tree Construction Algorithms	Phylogenetic Tree Construction and Clustering Algorithms	Clustering Data Algorithm
power, grid, system, energy, voltage, battery, renewable, proposed, control, electricity, load, charging, demand, storage, model	Power Grid Systems and Renewable Energy	Power Consumption and Energy	Energy Systems	Renewable Energy Grid Systems and Storage Solutions	Renewable Energy Grid Management	Smart Grid Energy Storage Systems	Power Grid System
traffic, vehicles, vehicle, driving, lane, model, autonomous, prediction, road, time, based, pedestrian, flow, network, trajectory	Autonomous Vehicles	Road Safety	Autonomous Vehicles	Autonomous Vehicle Traffic Flow Modeling	Autonomous Vehicle Traffic Flow Modeling	Autonomous Vehicle Traffic Flow Modeling	Traffic Vehicles Vehicle
imaging, resolution, microscopy, image, phase, images, optical, ultrasound, diffraction, light, speckle, method, reconstruction, high, scattering	Optimal Microscopy Imaging Techniques	Microscopic and High-Resolution Imaging	Optimal Microscopy Imaging Techniques	Advanced Imaging Techniques in Microscopy and Optical Systems	Optimal Imaging Techniques	High Resolution Optical Imaging Techniques	Imaging Resolution Microscopy
withdrawn, paper, author, comment, authors, phys, due, university, reply, arxiv, rev, professor, lett, error, cond	Paper Withdraw and Errors	Physics Papers and ArXiv Corrections	Arxiv Withdrawn and Corrected Papers	Retractions and Corrections Notices	Arxiv Withdrawn and Correction Notices	Physics Research Paper Review and Discussion	Withdrawn Paper Author

Topics	Human 1	Human 2	Human 3	GPT	Llama 3.1 8B	Llama 3.2 3B	BERTopic
fractional, derivative, order, caputo, derivatives, numerical, equations, differential, method, time, equation, scheme, solution, alpha, calculus	Mathematics for Differential Equations	Fractional Calculus	Fractional Calculus	Fractional Calculus and Numerical Methods for Differential Equations	Fractional Calculus and Caputo Derivative Methods	Caputo Fractional Calculus Method	Fractional Derivative Order
players, team, player, teams, sports, football, game, league, soccer, season, games, performance, basketball, data, matches	Player Statistics Analysis	Football Team Sports Analysis	Sports Analytics Research for Team and Players	Team Sports Performance Analysis	Sports Performance Analysis	Sports Performance Analysis	Players Team Player
localization, indoor, positioning, accuracy, based, location, fingerprinting, wifi, rss, fingerprint, signal, uwb, wireless, rssi, proposed	Security Technology	Secure Indoor Wireless Positioning	Wireless Position and Signal Accuracy	Indoor Wireless Positioning Techniques	Indoor Wireless Localization Techniques	Indoor Localization Using Wireless Signal Fingerprinting	Localization Indoor Positions

Table 3: Comparison of Topic Labels Generated by Humans and Models for Amazon Reviews

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
keyboard, mouse, router, one, monitor, wifi, cable, use, great, works, work, keys, it, would, like	Computer Accessories Reviews	Tech Accessories Reviews	Computer Accessories Reviews	Peripheral and Connectivity Device Performance	Computer Hardware Setup and Functionality	Computer Setup Accessories	Keyboard Mouse Router
sound, radio, great, quality, good, antenna, one, music, headphones, alexa, use, get, like, would, echo	Alexa Speaker Reviews	Bluetooth Device Reviews	Headphones Reviews	Audio Experience and Smart Speaker Integration	Alexa-enabled Radio Headphones Review	Amazon Echo Sound System	Sound Radio Great
case, tablet, kindle, ipad, screen, cover, it, like, love, one, great, fire, would, fits, use	Tablet Case Reviews	Apple Product Reviews	Tablet Case Reviews	Tablet and E-Reader Protective Cases	Tablet Case Reviews	Tablet Case	Case Tablet Kindle
battery, charge, charger, watch, batteries, charging, cord, phone, one, great, gps, cords, use, garmin, works	Various Battery Reviews	Watch Charger Reviews	Various Battery Reviews	Battery and Charging Accessories for Electronics	Garmin Watch Charging and Battery Performance	Garmin Watch Battery Life	Battery Charge Charger
camera, lens, cameras, tripod, great, it, use, one, good, quality, get, would, well, like, video	Camera Reviews	Photography Equipment Reviews	Camera Reviews	Camera Equipment and Usage	Camera Performance and Quality	Camera Equipment Review	Camera Lens Cameras
bag, great, backpack, price, good, love, quality, color, laptop, well, product, nice, sturdy, cover, works	Backpack Reviews	Back to School Accessory Reviews	Accessory Reviews	High-Quality Laptop Backpack Reviews	Product Quality and Design	Backpack Reviews	Bag Great Backpack
works, great, love, product, expected, perfect, advertised, good, it, needed, thanks, exactly, worked, perfectly, thank	Positive Product Review	Happy Customers	Positive Product Review	Positive Product Satisfaction	Customer Satisfaction with Product Performance	Positive Product Review	Works Great Love

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
drive, fan, card, laptop, fans, computer, ssd, one, drives, case, memory, power, ram, great, it	Computer Hardware	Computer Hardware	Laptop Accessories	Computer Hardware and Performance Components	Laptop Upgrades and Components	Laptop Computer Hardware	Drive Fan Card
product, fast, working, great, shipping, months, works, stopped, arrived, item, worked, delivery, one, service, work	Fast Shipping	Product Shipping Reviews	Shipping Experience	Product Performance and Delivery Satisfaction	Product Performance and Delivery Experience	Electronics Product Performance and Delivery	Product Fast Working
tv, remote, projector, picture, hdmi, one, fire, great, roku, cable, stick, screen, use, amazon, quality	Roku Stick	TV Product Reviews	TV Product Reviews	Home Entertainment Devices and Connectivity	Smart TV and Streaming Device Reviews	Amazon Fire TV Projector Reviews	TV Remote Projector
easy, install, set, use, great, works, setup, product, instructions, up, assemble, good, installation, it, installed	Easy Install Products	Easy Install Products	Customer Installation Satisfaction	User-Friendly Installation and Setup	Product Installation Experience	Electronics Installation Experience	Easy Install Set
mount, tv, stand, wall, monitor, desk, screws, sturdy, easy, monitors, mounting, one, great, would, bracket	TV Wall Mount	Wall Mounts	TV Accessories	TV and Monitor Mounting Solutions	TV Mounting and Installation	TV Mount Bracket	Mount TV Stand
band, fitbit, bands, strap, wrist, watch, comfortable, love, ties, like, one, fit, wear, original, great	Fitbit Reviews	Fitbit Reviews	Fitbit Reviews	Fitness Watch Bands and Strap Comfort	Fitbit Band Comfort and Design	Fitbit Watch Bands	Band Fitbit Bands
stickers, air, label, bubbles, clean, dust, product, sticker, great, labels, plastic, cleaning, stick, adhesive, use	Sticker Cleaning	Adhesive Cleaning Stick Reviews	Sticker Cleaning	Adhesive Product Application and Cleaning	Adhesive Properties and Performance	Adhesive Sticker Cleaning Products	Stickers Air Label

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
light, lights, bulb, bright, lamp, lighting, led, use, one, great, brightness, bulbs, easy, ring, like	Lights Performance	Good LED Light Reviews	Good LED Light Reviews	LED Lighting and Brightness Experience	Lighting Options and Performance	Smart lighting	Light Lights Bulb
fit, fits, perfect, perfectly, great, well, looks, good, works, install, head, product, easy, harness, nice	Product Fits Perfect	Product Fits Perfect	Customers Happy With Product Fit	Product Fit and Installation Satisfaction	Product Installation and Fit	Electronics Headphones	Fit Fits Perfectly
water, waterproof, shower, camera, underwater, pool, speaker, great, swimming, use, sound, fish, pictures, snorkeling, good	Waterproof Camera	Waterproof Camera	Waterproof Accessories	Waterproof Electronics and Accessories Usage	Waterproof Camera Experiences	Waterproof Camera for Swimming and Snorkeling	Water Waterproof Shower
printer, print, ink, printing, hp, cartridges, scanner, cartridge, printers, prints, paper, printed, work, one, epson	Printer and Printer Accessories	Printer and Printer Accessories	Printer and Printer Accessories	Printer and Ink Cartridge Performance and Usability	printer Performance and Maintenance	Printer and Printer Supplies	Printer Print Ink
protection, lock, security, protective, protects, protect, good, great, locks, product, system, well, home, it, price	Security Products	Security Products	Good Security Products	Home Security Systems & Accessories	Home Security Systems	Home Security Systems	Protection Lock Security
dislike, nothing, dislikes, disliked, product, anything, hate, liked, it, like, love, everything, dont, fact, works	Mixed Item Reviews	Mixed Item Reviews	Mixed Item Reviews	Mixed Reactions to Electronics Products	Product Satisfaction	Product Review	Dislike Nothing Dislikes

Table 4: Comparison of Topic Labels Generated by Humans and Models for 20 Newsgroups Dataset

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
game, team, year, games, hockey, players, season, play, writes, baseball, last, league, win, player, would	Hockey and Baseball Discussions	Hockey and Baseball Discussions	Sports News	Sports Discussions and Analysis	Hockey Season Recap	Baseball Team Performance Over the Past Year	Game Team Year
israel, people, one, writes, would, article, god, israeli, Jews, think, say, arab, believe, it, right	Israel-Palestine Conflict	Israel Articles	Israel Discussion	Middle Eastern Politics and Religion Debate	Israel-Palestine Conflict and Religious Discussions	Israel-Palestine Conflict	Israel People One
drive, scsi, card, windows, disk, modem, ide, drives, controller, use, problem, dos, hard, system, bus	Computer System and Drives Problem	DOS Based Computers	SCSI Computer Drives	Computer Hardware and Storage Solutions	Computer Hardware Troubleshooting	Windows SCSI Hard Drive Installation and Configuration Issues	Drive SCSI Card
gun, people, would, fbi, guns, think, fire, president, writes, article, batf, one, koresh, government, right	Waco FBI Investigation	Gun Control	Gun Laws	Gun Control and Government Regulation Debate	Waco Siege And Gun Control Debate	Waco Siege And Gun Control Debate	Gun People Would
windows, window, jpeg, file, image, use, files, color, graphics, program, display, gif, version, os, format	Graphics in Windows OS	Windows Graphic and Image Setup	Image and Graphics File Type	Graphics and Image File Formats on Windows	Image File Formats and Display	Graphics and Image File Formats on Windows	Windows Window JPEG
space, launch, nasa, orbit, earth, would, shuttle, moon, solar, mission, spacecraft, satellite, writes, lunar, like	NASA Mission Discussions	Space Discussions	Space Discussions	Space Exploration and Missions	NASA Space Missions	NASA Space Mission to the Moon	Space Launch Nasa

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
key, encryption, clipper, chip, keys, government, privacy, security, escrow, use, des, nsa, would, secure, algorithm	Government Encryption Discussions	Government Encryption Discussions	Privacy and Government Encryption Discussions	Government Encryption Policy Debate	Clipper Chip Encryption Controversy	Government Issued Encryption Key Escrow System	Key Encryption Clipper
sale, 00, offer, price, shipping, please, asking, condition, drive, mail, new, cd, sell, 10, interested	CD Sales	CD Sales	Sales on Online Marketplace	Classified Ads and Product Listings	CD Sale Inquiry	Used CDs for Sale	Sale 00 Offer
bike, dod, writes, dog, ride, article, riding, motorcycle, like, helmet, get, bikes, one, car, front	Motorcycle Ride	Biking Discussions	Different Bikes	Motorcycle Riding and Safety	Motorcycle Riding and Safety	Motorcycle Riding and Safety	Bike Dod Writes
msg, patients, medical, disease, doctor, food, cancer, treatment, one, candida, pain, yeast, health, 92, vitamin	Medical Treatment Discussions	Medical Drug Dosages and Treatments	Health and Treatment Discussions	Alternative Medicine and Health Disorders	Candida and Yeast Infections in Cancer Patients	Canadian Related Medical Treatment and Health Issues	Msg Patients Medical
god, jesus, bible, christ, church, one, would, mary, christian, heaven, hell, people, faith, sin, believe	Christianity	Christian Church	Religion	Christian Theology and Belief Systems	Christian Theology and Belief Systems	Christian Theology	God Jesus Bible
car, cars, engine, ford, dealer, writes, price, article, new, mustang, oil, would, like, miles, one	Ford Cars	Car Discussions	Car Discussions	Automobile Discussions and Reviews	Ford Mustang Review	Ford Mustang Car Maintenance and Ownership Costs	Car Cars Engine
mail, address, comp, list, gopher, ftp, software, please, email, system, group, space, files, graphics, mac	Email	SA Mail	Online Mailing	Internet Communication and File Sharing	Macintosh Software Distribution	Computer Software and File Sharing	Mail Address Comp

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
printer, print, fonts, hp, font, deskjet, printers, laser, ink, windows, printing, postscript, use, paper, truetype	Printer Discussions	Printer Discussions	Printer Discussions	Printer Technology and Troubleshooting	Printer Technology and Printing Options	Computer printer technology	Printer Print Fonts
armenian, turkish, armenians, armenia, turks, turkey, people, said, soviet, azerbaijan, genocide, greek, russian, one, greece	Armenian Genocide	Middle Eastern Conflicts	National Genocide	Armenian-Turkish Relations and Historical Conflict	Armenian-Turkish Conflict and Genocide Debate	Armenian Genocide	Armenian Turkish Armenians
radar, detector, detectors, car, receiver, alarm, radio, would, use, one, get, transmitter, antenna, valentine, writes	Radar Detector Equipment	Wireless Detection Systems	Radar Signal Detectors	Radar Detectors Technology and Usage	Car Radar Detector Technology	Valentine's Day Radar Detector	Radar Detector Detectors
polygon, points, algorithm, polygons, sphere, line, problem, lines, point, plane, surface, routine, p1, convex, xxxx	Geometric Computer-Generated Graphics	Computational Geometry	Geometric Shapes and Properties	Geometric Algorithms for Computational Geometry	Convex Hull Algorithms	Convex Polygon Algorithms	Polygon Points Algorithm
insurance, health, private, care, canada, geico, canadian, system, coverage, doctors, hospital, medical, pay, americans, writes	Health Insurance	Health Care America and Canada	Health Insurance Systems	Healthcare and Insurance Systems Comparison	Canadian Health Insurance for Americans	Canadian Private Health Insurance	Insurance Health Private
monitor, tempest, power, monitors, computer, computers, hours, turn, electricity, day, 24, equipment, pick, emissions, consumption	Computer Power Consumption	Power Consumption in Computers	Energy Consumption of Computer Monitors	Energy Consumption and Emissions in Computer Equipment	Energy Efficiency in Computer Monitors	Electricity Consumption	Monitor Tempest Power

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
battery, concrete, batteries, discharge, acid, lead, temperature, floor, dirt, reaction, heat, stored, electrolyte, terminals, garage	Battery Leak and Safety	Battery Types	Battery Types	Lead-Acid Battery Maintenance and Storage Practices	Battery Corrosion and Storage	Battery Maintenance and Storage in Garages	Battery Concrete Batteries
cpu, fan, heat, sink, fans, power, chip, idle, cooling, hot, computationally, running, intensive, case, supply	CPU Cooling	Computer Building	CPU Technology	Computer Cooling and Thermal Management	Computer Cooling Systems	Computer Cooling and Thermal Management	CPU Fan Heat
photography, kirlian, pictures, krillean, leaf, aura, object, corona, spelling, energy, involves, taking, sci, plates, huey	Space Photography	Natural Research	Photography Discussions	Kirlian Photography and Aura Imaging	Kirlian Photography	Kirlian Photography	Photography Kirlian Pictures
blue, uv, boards, leds, light, led, green, solder, mask, bulb, emit, board, bulbs, colour, seen	Led Bulbs Technology	UV Led Lighting	LED Light Bulbs	LED Lighting and Circuit Boards	Electronics and Lighting	LED Lighting Boards	Blue UV Boards
cancer, cholesterol, medical, circumcision, diet, health, pregnancy, teacher, drug, fat, disease, biology, sperm, risk, birth	General Health Risks	Cancer Health Conditions	Various Health Risk Discussions	Health and Medical Discussions	Pregnancy and Fetal Health Risks	Pregnancy and Fertility Health Risks	Cancer Cholesterol Medical
paint, wax, finish, car, scratches, rowlands, lisa, buff, dull, plastic, good, scuffed, fiance, bike, black	Car Paint Restoration and Repair	Automotive Cleaning	Car Detailing Jobs	Automotive Paint Care and Maintenance	Car Paint Repair and Refinishing	Car Paint Protection and Restoration	Paint Wax Finish

Table 5: Comparison of Topic Labels Generated by Humans and Models for World Cup Tweets

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
cup, world, worldcup, rt, team, 2022, fifa, qatar, live, win, nft, football, worldcup2022, join, championship	Qatar World Cup 2022	World Cup Qatar	Soccer World Cup 2022	FIFA World Cup 2022 Events and Updates	World Cup 2022 Football Tourna-ment	FIFA World Cup 2022	Cup World WorldCup
amp, follow, hours, proof, rt, join, 24, international, icc, 100, 40rt, 80, 40, 24350, 477	Cricket Interna-tional Coverage	Social Media En-gagement	Cricket Social Media Campaign	International Cricket Chal-lenges and Promo-tions	ICC Cricket World Cup 2022 Live Updates	World Cup Inter-national Football	Amp Follow Hours
optout, reply, thanks, unsubscribe, fifaworldcuponfox, tweet, crazyfootballongotv, usa, playing, optingin, well, biggest, stop, enjoy, tournament	US FIFA Team Coverage	World Cup Ad and Promo	World Cup TV Streaming	User En-gagement and Viewing Options for World Cup Coverage	Opting In/Out of FIFA World Cup TV Coverage	US World Cup 2022 Opt-Out and Feedback on Fox Sports	Optout Reply Thanks
airdrop, 000, token, 10, airdrops, join, 120, lfg, fb, biggest, msp, metasports, msg, us, progress	Crypto	Crypto	Airdrop Cryp-tocurren-cies	Cryptocurrency Airdrop Promo-tions	World Cup 2022 Airdrop and Token Rewards	MetaSports Airdrops	Airdrop 000 Token
katara, hayya, karwa, fiverr, aang, zuko, editing, khor, photo, arhbo, studios, card, directed, fi, light	Avatar The Last Airbender	Avatar The Last Airbender	Photo Editing and Media	Media Produc-tion and Graphic Design Services at Qatar World Cup 2022	Avatar: The Last Airbender Fan Editing and Fan Art	World Cup 2022 Football Tourna-ment Coverage	Katara Hayya Karwa
prediction, share, nftplayer, constantly, project, para, vote, voting, update, latest, world, score, make, nft, football	NFT Football Platform	Crypto	Football NFTs	NFT Football Predic-tions and Voting Platforms	NFT Football Predic-tions and Voting Platforms	World Cup NFT Prediction Market	Prediction Share NFT-player

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
mls, series, phillies, philadelphia, union, lose, bowl, philly, super, day, tough, eagles, lost, fans, superbowl	Philadelphia Eagles Superbowl Loss	Philadelphia Football Performance	Philadelphia Football and Baseball Discussions	Philadelphia Sports Losses and Fan Reactions	Philadelphia Sports Rivalries and Disappointments	Philadelphia Eagles Superbowl Loss	MLS Series Phillies
x7, x8, x4, x3, league, rey, champions, del, pr, club, liga, copa, european, la, sure	EU Championships	Football (American Soccer) League	Football League Champions	European Football Leagues and Competitions	Soccer Club Performance and League Rankings	South American Football Championship	x7 x8 x4
concentration, camps, poster, 1978, arg, calling, protest, french, boycott, no, football, rt, cup, world, coba	Historical Wrongs	Holocaust Boycott	French Protests 1978	Boycott and Protest of the 2022 World Cup	1978 World Cup Boycotts	French Football Fans Boycott World Cup 1978	Concentration Camps Poster
lecturing, urging, morality, written, focus, part, teams, tournament, fifa, rt, cup, world, dr, moralsk, overg	Tournament Morality	FIFA Morality Discussions	FIFA World Cup Protest	Ethical Debates Surrounding FIFA World Cup 2022	FIFA World Cup Morality Debate	FIFA World Cup Morality and Ethics	Lecturing Urging Morality
dapp, gttooneychain, immersion, tooneychain, introduction, environment, thread, better, rt, nws, vry, thy, signal, pump, announced	Blockchain Tech	Blockchain Tech	Various Blockchain Projects	Blockchain Gaming and Token Promotion	Cryptocurrency Market Hype and News	World Cup 2022 Cryptocurrency Hype	Dapp Gttooneychain Immersion
gunathilaka, danushka, sri, assault, sexual, cricketer, sydney, arrested, lankan, lanka, charged, rape, alleged, t20, danushkagunathilaka	Sexual Assault in Sydney	Rape/Sexual Assault Charge of Player	Sexual Assault by Cricketer	Arrest of Sri Lankan Cricketer Danushka Gunathilaka for Alleged Sexual Assault	Danushka Gunathilaka Rape Allegations	Sri Lanka Cricketer Danushka Gunathilaka Charged with Alleged Sexual Assault in Sydney	Gunathilaka Danushka Sri

Topics	Human 1	Human 2	Human 3	GPT-4	Llama 3.1 8B	Llama 3.2 3B	BERTopic
fiverr, editing, photo, careem, webdesign, graphicdesign, removal, satisfaction, photography, guarantee, background, sharp, contact, service, amazing	Fiverr Editing Service	Freelance Photo and Editing Work	Graphic Design and Photo Editing	Freelance Design and Editing Services	Professional Graphic Design and Photo Editing Services	Web Design and Photo Editing Services	Fiverr Editing Photo
virat, ponting, kohli, said, ricky, rauf, talked, remembered, trem, haris, six, looked, brings, knew, asia	Virat Kohli Tweets	Cricket Player Memories	Cricket Player Memories	Virat Kohli's Six Against Haris Rauf	Cricket Legends and Controversies	Virat Kohli and Ricky Ponting's Conversation About Haris Rauf	Virat Ponting Kohli
vinyl, vinylcollection, vinylcommunity, groovevinylstore, vintage, records, music, groovevinyl, imacelebrity, nowspinning, imaceleb, blackfriday, via, vinylrecords, thursdayvibes	Vintage Music	Vinyl Records	Vinyl	Vinyl Records and Music Collecting Community	Vinyl Enthusiast and Music Collectors	Vinyl Music Community and Collectibles	Vinyl Vinylcollection Vinylcommunity