Sagar Chhabriya

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RESEARCH INTERESTS

Multimodal Machine Learning, Vision-Language Models, Trustworthy AI, Medical Image and Image-Text Understanding, Retrieval-Augmented Generation, and Evaluation of Language Models.

EDUCATION

Bachelor of Science in Computer Science — Sept 2022 – Aug 2026
Sukkur IBA University (CGPA: **3.71**/4.0) — Sukkur, Pakistan

- **Distinction:** Gold Medalist
- **Relevant Coursework:** Machine Learning, Artificial Intelligence, Computer Vision, Data Science, Probability and Statistics, Linear Algebra, Design and Analysis of Algorithms, Human-Computer Interaction.

RESEARCH EXPERIENCE

Context-Aligned Reasoning for Medical Vision-Language Models — *arXiv preprint*
Second author, KnowledgeMR @ CVPR 2026 (poster) — *Apr 2026*

- Co-authored a framework in which a frozen vision-language model must reconcile radiomic statistics, Grad-CAM activations and vocabulary-grounded cues before returning a structured chest X-ray answer with evidence, uncertainty and safety notes, to reduce fluent but weakly grounded conclusions.
- Conducted cross-dataset evaluation on CheXpert, analyzing how radiomic statistics and text embeddings transfer across datasets; radiomic features achieved an AUC of 0.71, while text embeddings reached 0.50.
- Analyzed hallucination and reasoning behavior across experimental conditions, finding that image-plus-text conditioning reduced the average number of hallucinated keywords from 1.14 to 0.25, while tool-augmented reasoning shortened evidence explanations from 19.4 to 15.3 words without increasing model confidence.
- Designed the methodology figure, quantitative comparison tables, and conference poster to communicate the framework, experimental findings, and implications for reliable medical vision-language reasoning.

A Modular Empirical Analysis of RAG Pipelines on WikiQA and SQuAD — *SSRN preprint*
First author and corresponding author — *Under minor revision.*

- Motivated by RAG studies that report a single headline score without saying which design choice mattered, isolated four levers (6 chunking strategies, 9 embedding models, dense, BM25 and hybrid retrieval, and 7 generators from 82M to 7B parameters) across 44 main configurations and 18 further ablations on WikiQA and SQuAD.
- Built a reproducible BEIR-style benchmark and showed that corpus construction errors alone (a title-only corpus, or treating every candidate sentence as gold) force Exact Match to zero regardless of the generator.
- Reported retrieval metrics (Hit@k, MRR, answer-in-context) next to answer quality with 95% bootstrap intervals and paired significance tests on every comparison, so each failure can be attributed to the retriever or the generator.
- Found that the generator dominates (SQuAD Exact Match rises from 0.00 with an 82M base model to 0.65 with a 3B instruction-tuned model), BM25 trails dense retrieval (Hit@5 0.754 vs 0.902), and chunking has no significant effect, with semantic chunking the slowest.

Sentiment Classification of Hindi-English Memes (HASOC 2025) — FIRE (Working Notes)
NLP Research Assistant, VSL Lab, FAST-NUCES — June 2025 – Aug 2025

- Developed a TF-IDF and Random Forest pipeline for ternary sentiment classification of noisy OCR-extracted Hindi-Hinglish meme text, using 1,133 training samples from the HASOC 2025 shared task.
- Manually inspected individual dataset instances to diagnose weak baseline performance, identifying challenges related to OCR noise, code-mixing, and task-specific linguistic patterns.
- Created curated Hindi-Hinglish stopword and offensive-term dictionaries tailored to the dataset and integrated them into iterative preprocessing and model experiments.
- Improved macro-F1 from approximately 0.64 initially to 0.70 on the test set; evaluated the system using five-fold stratified cross-validation, and co-authored the resulting paper in the FIRE 2025 Working Notes.

PUBLICATIONS

[5] **Sagar Chhabriya**, Sumra Khan, Inad Alqurashi, Mansoor Ahmed, Rizwan Qureshi. *A Modular Empirical Analysis of RAG Pipelines on WikiQA and SQuAD: The Roles of Chunking, Embeddings, Retrieval, and Model Scale.* Under minor revision. [Preprint].

[4] **Sagar Chhabriya**, H. Dhingana, N. N. Dahar, A. Qadir. *Hirebase: A Cloud-Native Platform for AI-Assisted Recruitment with a Voice Interview Agent.* Bulletin of Toraigyrov University, Physics and Mathematics Series, 2026.

[3] Sumra Khan, **Sagar Chhabriya**, Aizan Zafar, Sheeraz Arif, Amgad Muneer, Anas Zafar, Shaina Raza, Rizwan Qureshi. *Towards Responsible Multimodal Medical Reasoning via Context-Aligned Vision-Language Models.* KnowledgeMR Workshop @ CVPR 2026 (poster); arXiv:2604.08815.

[2] **Sagar Chhabriya**, Sumra Khan, Rizwan Ahmed Khan, Mansoor Ahmed. *Agentic Retrieval-Augmented Generation: A Compact Review.* Journal of Computers and Intelligent Systems, 3(4):283–296, 2025.

[1] Muhammad Rafi, Saif Ur Rehman Awan, Ramsha Jat, Aiman Falak, Fatimah Ansari, Ahmed Raza, **Sagar Chhabriya**. *FAST-HASOC 2025: Multimodal and Multilingual Approaches for Hate Speech and Offensive Content Detection in Hindi Memes.* FIRE 2025 Working Notes, CEUR-WS Vol. 4173, pp. 625–631.

WORK EXPERIENCE

Machine Learning Trainer, atomcamp Islamabad, Pakistan
Aug 2025 – Present

- Mentored **80+ learners** and guided **30+ students** through end-to-end AI/ML projects and deployments.
- Conduct weekly sessions on ML, DL, NLP, Generative AI, MLOps, Docker, CI/CD, and cloud deployment.
- Designed capstone projects, coding labs, technical guides, and hands-on material for applied AI/ML development.
- Provide 1:1 mentorship and code reviews covering debugging, model evaluation, APIs, optimization, and deployment.
- Lead MLOps workflows covering data acquisition, experiment tracking, containerization, CI/CD, and deployment.
- Support students in translating AI/ML concepts into production-oriented, and deployable applications.

Programming Fundamentals Course Instructor, Times Tech Computer Center Kandhkot, Pakistan
Feb 2025 – May 2025

- Delivered a four-month C++ course to 15+ secondary-school students, covering core syntax and structured programming.
- Designed 25+ hands-on exercises and debugging activities to strengthen programming and problem-solving skills.

PROJECTS

Hire-Base (AI-Assisted HR & Recruitment Platform) | *React, FastAPI, PostgreSQL, Supabase, Azure, Groq, LiveKit, Deepgram, Claude, Cursor, Codex* **GitHub**

- Built an end-to-end **HR platform** for onboarding, hiring, assessments, interviews, and recruiter insights.
- Developed role-based **admin, recruiter, and candidate portals** with React, TypeScript, Tailwind, and Clerk.
- Built modular **FastAPI REST APIs** for authentication, jobs, applications, dashboards, and recruitment workflows.
- Designed **Supabase PostgreSQL and Storage** for users, resumes, applications, recordings, and recruitment data.
- Developed an **AI voice-interview agent** using LiveKit, Groq/Llama 3.1, Deepgram STT/TTS, and VAD.
- Implemented **AI assessments, live interviews, scoring, video analysis, and recruiter insights**.
- Automated **CI/CD with GitHub Actions** across frontend, backend, and AI agent deployments.

Graph Neural Networks for Aerodynamic Drag Prediction | *PyTorch, PyTorch Geometric, GraphSAGE, CFD*

- Developed a **GNN framework** to predict aerodynamic drag from airfoil CFD simulations.
- Represented unstructured CFD meshes as graphs using **nodal velocities and mesh connectivity**.
- Implemented **GraphSAGE with Top-K pooling** for graph-level aerodynamic drag prediction.
- Achieved a reported test R^2 **of 0.9837**, outperforming CNN and shallow regression baselines.
- Conducted **ablation and hyperparameter studies** to evaluate key architectural design choices.

SKILLS

- **Programming:** Python, C++, Java.
- **ML and NLP:** Scikit-learn, PyTorch, TensorFlow/Keras, NLTK, Hugging Face Transformers, FAISS, LangChain.
- **MLOps & Cloud:** Docker, GitHub Actions, W&B, GCP Cloud Run, AWS (EC2, S3), Azure Web Apps
- **Web & Dev Tools:** FastAPI, Streamlit, Git, GitHub Codespaces.

CONFERENCES

1st ICCA @ Salim Habib University May 2025
Presented: Agentic Retrieval-Augmented Generation: A Compact Review

AWARDS, CERTIFICATIONS & LEADERSHIP

- **Gold Medalist**, BS Computer Science, Sukkur IBA University.
- **Hacktoberfest 2025 Super Contributor**
- **Master Trainee PVE (EU-funded)**: Trained 185+ students in violent extremism prevention.
- **GitHub Foundations Exam:** Certified in Git, GitHub Actions, and project management.
- **Aspire Institute Leaders Program 2024** : Successfully completed Cohort 1 leadership training.
- **Prime Minister's Laptop Award 2023**: National merit recipient for academic excellence in Computer Science.
- **Book Review Competition Winner 2022**: Our team secured 1st place among 17 sections across 5 SIBAU campuses.