### Annota: Peer-based AI Hints Towards Learning Qualitative Coding at Scale

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- How might large classes be an advantage rather than a disadvantage for experiential learning?
- We repurpose label aggregation algorithms to provide peer-based hints that augment learning of complex work rather than for micro-task work.

# Intro & Context

- Learning qualitative analysis (QA) requires personalized feedback and in-depth discussion, but educators cannot provide this in large classes.
- To overcome this challenge, we introduce a learnersourcing method that builds on the Dawid-Skene expectation maximization algorithm (DS-EM) to generate peer-based AI hints that support students in one aspect of QA: determining what sentences are relevant to the research question.
- The Annota system was deployed in a large business strategy class (N = 122). Students each analyzed 8 stakeholder transcripts in relation to research questions, including: Strengths & Weaknesses, and Opportunities & Threats.
- We measure the quality of hints with a Macro-F1 score relative to expert labels/annotations. We understand the value to student learning through surveys, interviews, and an inductive qualitative analysis process.

# Peer-Based AI Hints in Annota

7/ranscript Interview with Jermifer	Coportunities and Threats When expectation and literature are the magnitudes facing in the external environment, e.g. the no objection, encoder, and object factors from competitions or cooperations	Viewing peer-based hints 'to/re down, but fire! free to take a look at the generated peer-based hints to make additional improvements if you'd like.
Current codirs (shift + alt + s)	Johnson 17:11	
Carrent Annestations RQ3: Opportunities and Threats	Got it.	
0 - social - have a nice caramics facility that can be used recent	Jerreifer 17:12 Thick car constrains research in the one multiple thing that actually does being papeds in from particle of	of the uniter from and
0 - social - need for advertising need for universe	places like that	Code
0 - social - need for artist subreach	UNIQUENESS AND STRENGTHS	O - social - people will drive just for construics classes
D - social - people will drive to kust for centenics classes	Johnson 17:25	Nerso
O - social - potential partners in ergs. who effer facilities far art other than savanics		Delete Con
0 - social - schoels pravide helpful aproximity	Jennifer 17:55	
0 - social - has a welcoming environment for entits	Well, yeah, Like our cenamic program, I think, is one of the one of the most unique ones. Urr, and it's ju have people in the past, some well known coramic artists that started it. So we have kilms and we have	Do you agree or disagree with this peer prediction?
O - social - the community worts a larger diversity in art classes	facility so that's probably one of our biggest strengths that sets us apart from use, use, other art cent	Agroe
0 - the community wants dance	CHALLENGES AND OPPORTUNITIES	what misconception did the hint help you
T - cooperation - ceramics facility	Johnson 1830	Nore of an internal strength, than an
requires a lat of manpower in maintenance	Got It. What are the greatest challenges and opportunities the Art Centhler faces?	esternal apportantly.
T - cooperation - lats of planned articities owner on thereofy	Jennifer 18:41	
T - cosperation - ceganization is a groblem	Himm, Well, I think one of the biggest challenges, which live mentioned before, is to try to tap into ear car membership into being volunteers and working more with them, with the various parts of the Art	Deade 6.1
T - economic - lack of adult classes	one of them. I know. So I know what that's like, it's I have a hard time asking for help. And but I think to	
T - economic - Umited number of people to help with growing	there's a lot of good ideas out there. So I think if we could really find a way to reach out to our member what we're planning and have them on more committees and that kind of thing. I think we real	Others' codes ::5
T - economic - United number of volunteers working on marketing	RESOURCES	O-Opportunity STRENGT-ICOMPETITION/WWW/ENERS
T - economic - very small number of people actively working	Johnson 19.57	O - niche ceranics program attracts
T - lacking in outwach prevents them		more engaged?





#### Results

- Annota predictions are **similar to the best students** and **far better than the average student or majority vote** in Macro-F1 scores, with quality gains primarily coming from **strong positive recall and negative precision**.
- Accurate feedback only requires ~15 annotators and assigning ~2 transcripts.
- Peer-based Al hints helped students improve their understanding of research questions, more carefully examine their transcript annotations, and improve their understanding of when they were overannotating or under-annotating the transcript.



### Collaborative Generative AI for Co-Creative Learning

- How might collaborative generative AI be used for learning the more complex and interpretive aspects of qualitative analysis (QA), beyond simply determining relevant sentences?
- After determining relevant sentences, they must be appropriately coded to capture their value relative to answering the research question. Could GenAl help students better articulate their intent behind making an annotation, for peers to more easily build upon their work in the later stages of QA?
- Discussion is an integral part of QA. Could GenAl facilitate discussion across large numbers of students to surface their unique perspectives and identify areas of disagreement for discussion?

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