CoderBot: AI Chatbot to Support
Adaptive Feedback for Programming Courses

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ABSTRACT:

Conventionally, learning analytics are used to notify students regarding their predicted performance and further resources using email or via a university's Learning Management System. To support students to engage in learning and become more pro-active about their learning, we designed CoderBot. CoderBot, is an Artificial Intelligent Chatbot service deployed on WhatsApp[1] as a coding assistant to support learning of computer programming. CoderBot has been deployed in our University's **Python Programming I** course. Students are able to interact with the assistant and find out the following:

(a) Personalized messages about predicted performance. A Predictive Machine Learning classification model is built by aggregating multiple sources of student data (academics, programming work, and logged interactions with offline and online resources), handcrafting features and extracting patterns of success on the course leveraging Artificial Intelligence techniques. The model is trained with two years of ground-truth data and cross-validated. Predictions are generated weekly for incoming student data. Using the classification probabilities, we divide students into deciles and designed a message for each group.

(b) Recommended material. Students are suggested material such as slides and exercises they might want to check out based on their progression and effort on the course.

(c) Short code snippets. Students can avail of code snippets that showcase functionality such as slicing lists, reading from files or printing arguments. 100+ snippets have been hosted on GitHub's gists, as that website is already optimized for easy code reading on smartphones.

In addition, students can ask for further help from the Lecturer or the University's support services, consult the terms of the project and opt-out at any time. Phone numbers are deleted at the end of the semester. Efforts are now being made to include Natural Language Understanding so students can ask questions in natural language.

Keywords: Computer Science Education, Learning Analytics, Feedback, Predictive Model.

Technologies: Python, Pandas, Numpy, Scipy, Scikit-learn, Whatsapp Wrapper API, Flask, MongoDB, Docker, Selenium, GitHub, GitHub's gists, Google's Phone Validator.

Code: https://github.com/dazcona/code-assistant

Video: https://www.youtube.com/watch?v=9HSLwvVzN8E

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[1] WhatsApp Messenger is a freeware and cross-platform messaging and Voice over IP service owned by Facebook