

Abstract

Pocket Winery - Become a Digital Winemaker

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1 Motivation

In the last two years I've always tried to find the best way to study for any of the Diploma exams. Whether I created Powerpoint presentations for D4 and D5, flashcards for D3, hand-written summary notes for D2 or just highlighting text for D1. Especially D1 felt hard to grasp at the beginning of my studies since I do not work in any wine-related business. D1 gives a detailed theoretical study of vine requirements and growing environment influences, grape growing and winemaking options. It builds a foundational level of theory knowledge needed for the study of subsequent modules and hence is crucial to the success of the Diploma. As a software developer for mobile apps, I wanted to combine my professional knowledge and experience with the theory and practice I learnt during the Diploma course at Weinakademie Österreich to make it easier for future students. Hence, the idea of Pocket Winery was born.

2 Objective and Challenges

The primary objective is to give a complementary source of education in a convenient and fun way by adding game mechanics to the study materials of the WSET Diploma. It is designed as an economic simulation game. Players of Pocket Winery slip into the role of a winemaker and are tasked with challenges any winemaker faces in the real world: taking care of the vines, reacting to weather events, deciding when to harvest, what style of wine is produced, etc. It is all virtual, and all in the palm of your hand on your smartphone. As a result, it is hoped to increase engagement with the study materials and introduce objectives that give learning a purpose.

The basis of Pocket Winery is a virtual growing environment that simulates the vine growth cycle in a realistic way. Only once a virtual growing environment is developed it is possible to build an engaging story on top and add educational materials into the app.

Due to the size of this topic, this thesis will solely focus on the development of a simulation model that simulates growth, which tries to find solutions for the following, non-exhaustive list of questions:

- How are temperatures, sunshine levels, and rainfall generated on a daily basis to precisely simulate the vine growth cycle?
- How to mathematically predict key phenological stages?
- How do common weather events like hail or drought occur and how to calculate the impact?
- What is the definition of ripeness? How to calculate ripeness?

3 Methodology

Understanding grape berry development, estimating base temperatures and growth phase duration, and predicting key phenological stages are all important aspects for the development of viticultural simulation models. Hence, scientific literature about grape berry development and phenological modelling were reviewed. Then, a prototype was developed using the *Swift* programming language.

4 Content

The content of this thesis is divided into four parts, including the introduction and conclusion. It discusses common study strategies that students often use, familiarises the reader with the term gamification and gives an understanding why Pocket Winery is a reasonable idea for wine studies, and examines related work. It then goes into detail how a realistic, virtual growing environment is created by breaking down viticulture into small building blocks that a computer can work with. Then a conclusion is drawn, future work is listed, and personal commentary is added.

5 Conclusion

With the modelling approach used in this thesis, it was possible to achieve an extensible prediction model for grape varieties based solely on their optimal base temperatures and the region's monthly temperature data. Although the model should be tested with more varieties and more data in the future to significantly enhance the accuracy and the effectiveness of these predictions, it lays the foundation for Pocket Winery. The next step is to develop simulation models for winemaking, write an engaging story on top, and lastly, develop and publish the mobile application.