Reliable Profiling for Chocolate and Cacao

Models of Flavour, Quality Scoring and Cultural Profiling

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International Institute of Chocolate and Cacao Tasting
History: Blended Bars, Informal Systems

Past Objectives: Reproducible Profiles
- Fine flavour beans chosen by market/experts
- Mostly bulk beans: emphasis on ‘quality’
- Flavour not systematically quantified
- Work focussed on consistency in bulk

Simple Flavour Representations
- Flavour wheels, often constructed ad-hoc
- Spider diagrams, usually with arbitrary axes
- Text descriptor lists based on expert opinion

Early Attempts at Scoring
- 'Finger-in-the-air' single marks relying on expert consensus
- Technical scores not based on flavour
- Combination scores with no formal rules
Today: Stratified Markets, Precision Profiling

Diverse Objectives
- Consistent assessment of bulk beans
- Rapid field assessment of quality & potential
- Detailed profiling of fine beans
- Sorting into markets

Needed: Reliable Flavour Profiles
- Systems that mirror human flavour sense
- Systems that classify flavours separably
- Systems usable with minimal prior expertise

Needed: Reproducible Scores
- Weighted sum of scores
- Statistically significant number of evaluations
- Scores based on factors correlated to actual quality

Refined Attribute Map
• Based on PCA of flavours from a neural network model

Added Defect Map
• Same as attribute map, for defects.
  Still in development

Structured Routing
• Based on how we taste
• Starts with basic like/dislike
• Asks for progressively refined detail

Global Quality Score
• Builds a score from exponentially weighted sum of components
How does it work?

Level 1: Like/Dislike
- Like/Indifferent/Dislike/Unsure
- (~50% of score)

Level 2: Level of Like/Dislike
- 1-5 scale from vague to strong like/dislike
- (~25% of score)

Level 3: Detailed Profile
- Flavour/defect map points
- Scored by +/- points detected
- (~12.5% of score)

Level 4: Technical Points
- More 'traditional' attributes used by experts
- (~12.5% of score)
### Group session sample *

- Choose a sample/batch |

### Add a new flavour profile

<table>
<thead>
<tr>
<th>Sample</th>
<th>Date (GMT)</th>
<th>This profile</th>
<th>Personal overall profile</th>
<th>Group</th>
<th>Score</th>
<th>Edit</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Chocolate - My Bar</td>
<td>21/04/18 9:59pm</td>
<td>HERBAL/SPICY</td>
<td>HERBAL/SPICY</td>
<td>DARK</td>
<td>3.96</td>
<td>Edit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAVOURY</td>
<td>SAVOURY</td>
<td>SWEET</td>
<td></td>
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<tr>
<td></td>
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<td>CHEMICAL</td>
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<td>MINERAL</td>
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<td></td>
<td></td>
<td>ANIMAL</td>
<td>ANIMAL</td>
<td>BACTERIAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quality score 3.76

### Quality score 4.07
What do you get?

Global Score

- Weighted sum from each level
  - 0-4 = defective
  - 4-5 = commodity
  - 5-7 = premium commodity
  - 7-8 = fine
  - 8+ = world-class
What do you get?

Aggregate Profile

- Attributes and defects shown as a group summary
What do you get?

Technical Marks

- Score and range indicated for characteristics, eg:
  - Acidity
  - Complexity
  - Astringency
  - Balance
  - Bitterness
Build Characteristic Profiles for:
- Origins
- Batches
- Harvests
- Chocolate makers
- Varieties

Ara Chocolat – Porcelana, Venezuela

Guido Castagna – Madagascar raw

Shattel – Kimbiri, Peru
What’s next?

Roll out
• Field use and testing
• Chocolate library beta test
• Personal/group use

Development
• More sophisticated models
  o Brain pathways
  o Chocolate flavour compounds
• Affective map
  o Associated emotions/feelings
• Improved Chemical Analyses

La Rifa, Mexico, white bean
Cultural Profiling

Creating a complete marketing package
Marketing origin: flavour and cultural profiling

- Wholistic and flexible sensory evaluation approach
- Intuitive and visual system, layered design
- Archival reference and marketing tool for growers/makers
- Quality rating and flavour profiling are only one part of a marketing package for cacao
- Genetic, cultural, social, historical and geographical matrix of each cacao is just as important in the fine market
Marketing origin: flavour and cultural profiling

- Evaluation and profiling exists to help sell quality cacao for a higher price
- New food products without a compelling story to tell have few chances to succeed
- Any evaluation system for cacao and chocolate should:
  - highlight virtues
  - pinpoint problems for corrections
  - provide tools for successful marketing