Mating data capture

ICAR Annual Conference
Tony Francis
DataGene Overview

Herd Improvement Industry Software from HICO (MISTRO)

Central Data Repository
CDR System design
Decision Support Tool Development

Service Provider Users

Farmer Users

Industry Users

DataGene Software

Analytics / Tools
Reports / Apps

DataGene
Solutions for Herd Development
HerdData App
The challenge
Project Scope

Using voice activated offline data capture

- Cow side mating data capture
- Metadata: Cow ID, Bull common name, Date, Farm ID, Technician ID
- Voice recognition in a noisy, wet and dirty environment
- Electronic AI docket
- Send request for artificial insemination services to the service provider
Voice activated data capture

- Target Audience
  - AI Techs & farmers

- End User Engagement
  - Visited farms
  - Observed Sync Programs
  - Consulted with AI providers
  - Interviewed technicians and farmers

- Current methodology
  - Cow ID and Bull ID manually recorded on paper
Scenarios

▶ Farmers know the cows on heat and the technician only knows the number of cows on heat - AI docket can be pre-populated

▶ Technician knows the bull names beforehand and keeps a stock of straws for the farmer

▶ Farmer orders the inventory with the service provider, and stores the straws on his farm
Voice activated data capture

- Solution: Online/Offline resources
  - Data capture at the time of insemination
  - Mobile application having speech recognition capabilities
  - Keywords trained as commands for the recognition

- Features
  - Offline Speech detection
  - Integrate with the existing systems
  - Separate application for farmers and technicians
Technical framework

- Programming Languages
  - Android – Java
- Databases
  - SQLite
  - MySQL
  - SQL Server
- Pocket Sphinx
  - Benefits
    - Lightweight / Free / Offline capability
  - Downsides
    - Accuracy Issues
  - Functionality
    - Language model mode / Keyword phrase mode / Grammar mode
Challenges

Functional:
- Noisy, wet, dirty environment
- Bull common names have similar matches
- Users accents

Technical:
- Native vs Hybrid
- Programming language: C# .NET and Java/Swift 3
- Accuracy of offline speech recognition library
AI Android Application Data Flow

**DataGene Central Data Repository**

**MySQL Database**
- Jobs uploaded to server
- Download jobs from server
- Upload completed jobs and confirmed matings

**Farmers Mobile App**
- Enter AI Job
- Enter matings for the job

**Technicians Mobile App**
- Complete jobs with voice recognition and voice commands

Jobs stored on phone (SQLite Database)
Farmer App
Farmer Login Activity

- LOG IN click.
- Connects with MySQL database.
- Runs authentication process.

Farm Table

<table>
<thead>
<tr>
<th>Farm_Id</th>
<th>FarmPass</th>
<th>Farm_Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Password</td>
<td>Cohuna Farm</td>
</tr>
<tr>
<td>2</td>
<td>Password</td>
<td>Farm1</td>
</tr>
</tbody>
</table>
Jobs List Activity

- Checks MySQL database for jobs.
- Displays jobs as a list.
- Currently there are no jobs for this farm.
- NEW JOB click starts the New Job Activity.
New Job Activity

- Electronic AI docket.
- Select Date, AI Company & matings.
- SEND JOB click uploads the job info and mating list.
New Job Activity

- Jobs list is now updated with new job.
- Jobs and matings tables have been updated.

Jobs Table

<table>
<thead>
<tr>
<th>Job_Id</th>
<th>Farm_Id</th>
<th>Complete</th>
<th>Tech_Id</th>
<th>AI_Company_Id</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>NULL</td>
<td>2</td>
<td>0</td>
<td>NULL</td>
<td>1</td>
</tr>
</tbody>
</table>

Matings Table

<table>
<thead>
<tr>
<th>Mating_Id</th>
<th>Cow_Id</th>
<th>Bull_Id</th>
<th>Job_Id</th>
<th>Tech_Id</th>
<th>AI_Company_Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>1234</td>
<td>christmas</td>
<td>36</td>
<td>NULL</td>
<td>NULL</td>
</tr>
<tr>
<td>64</td>
<td>4567</td>
<td>christmas</td>
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<tr>
<td>66</td>
<td>5643</td>
<td>westgate</td>
<td>36</td>
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<td>67</td>
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<td>goldcrest</td>
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</table>
AI Technician’s App
Technician Login Activity

- Connects to MySQL database.
- Runs authentication process.
- User info stored for fast-login.

Tech Table

<table>
<thead>
<tr>
<th>Tech_Id</th>
<th>Company_Id</th>
<th>First_Name</th>
<th>Last_Name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Sam</td>
<td>Mc</td>
<td>Password</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>John</td>
<td>Johnson</td>
<td>Password</td>
</tr>
</tbody>
</table>
Technician Job List Activity

- Jobs List loaded from MySQL.
- Jobs & Matings saved to SQLite for offline viewing.
- Job list loaded from SQLite if no internet connection.

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<tr>
<td>36</td>
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Select Job Type

- Normal: Tech reads out a cow number, mobile reads out bull.
- Sync Program: Tech reads out Bull of the Day, followed by the cows.
- Also supports multiple bulls of the day.
Voice Recognition Activity

- Pocket Sphinx Voice Recognition API.
- No internet connection required.
- Mating list loaded from SQLite database.
- Grammar files are created for herd and bull list.

<table>
<thead>
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<th>Bull Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>1234</td>
<td>christmas</td>
</tr>
<tr>
<td>4567</td>
<td>christmas</td>
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Voice Recognition Activity

Matings saved to Confirmed Matings table in SQLite as cow numbers are read out.

Commands

- “ASSIGN BULL” – for entering Bull of the Day (Sync Program).
- “ASSIGN COW” – for entering cow numbers.

<table>
<thead>
<tr>
<th>Cow Id</th>
<th>Breed</th>
<th>Cow Id</th>
<th>Breed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1234</td>
<td>christmas</td>
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Review Activity

- For manual changes.
- On FINISH click, job is uploaded to the Completed Jobs in MySQL and deleted from the Jobs table.
- Mating list is uploaded to Confirmed Matings and deleted from Mating table.

### Completed Jobs Table

<table>
<thead>
<tr>
<th>Job_Id</th>
<th>Farm_Id</th>
<th>Tech_Id</th>
<th>AI_Company_Id</th>
<th>Date</th>
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</thead>
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<tr>
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<td>1</td>
<td>15-02-2017</td>
</tr>
</tbody>
</table>

### Confirmed Matings Table

<table>
<thead>
<tr>
<th>Mating_Id</th>
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<th>Job_Id</th>
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</table>
The first alpha version
Thank you

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