***Context-Aware Mobile Piste Apps***

What problems are they trying to resolve

* Paper piste maps are large and difficult to use in the skiing weather
* Information provided on maps may not be up-to-date
* Doesn't provide enough information which a skier may need such as weather or potential dangers/updates

Introduction of System

* A way of providing dynamic information about piste's which can be used by skiers to evaluate which piste to travel down. Information includes factors such as:
  + Wind
  + Surface Temperature
  + Open/Closes
  + Weather Updates
* Users can filter their choices depending on their preference and skill on the help which can then provide the most suitable piste's

Approach

* Layers: The mountain map was split up into different layers which each represented its own information such as a layer for ski-lifts, run labels, lift labels etc. The different layers can be toggled on and off depending on the users' choice
* Runs (Piste's): Runs are categorised from 1 to 5 (1 being the lest suitable and 5 being the most suitable) after the user has chosen their preferences. These were then visually categorised using 4 different methods:
  + Colour Saturation: These runs are then colour saturated from a faded red to a vivid red to help represent its suitability and make it more visible on the map
  + Suitability Bar: The suitability number would be placed in [ ] within the run name
  + Direct Labelling: A bar was placed on the right hand side of the runs, indicating the suitability; a suitable run would be indicated by a filled green bar.
  + Thickness: Run routes would be thicker if they were more suitable or thinner if they weren't

Implementation

* Developed in Java and implemented on a Nokia 6680 phone
* Fixed set of weather variables was used throughout the entire test, such as
  + The further the run from the main-site, the less likely it would be regularly groomed
  + The higher the run, the more the temperature dropped

Evaluation Setup

* 10 users were chosen who were all experienced skiers, however at different skill abilities. Users were split up into 2 groups of 5 for each scenario (one group for paper maps and the other for mobile apps)
* 6 scenarios were created to evaluate both of the methods, mobile app and paper piste maps (with external information such as weather presented on a different paper for the paper piste maps). Scenario's were split up into groups of 2 due to their resemblance. Here are the scenario's in Lehmann's terms:
  + Run Suitability
    1. Find the best 5 runs for yourself, by adding personal preferences
    2. Find the best 3 runs for 2 skiers who want to challenge each other by adding specific preferences
  + Route Suitability

1. Find the best route from 1 location to another, with very little preferences
2. Find the best route from 1 location to another, however preferences must include novice ability skiers
   * Fastest Route
3. Find the fastest route from 1 location to another, with no preferences for an advanced skier
4. Find the fastest route from 1 location to another, with some preferences for an intermediate skier

Evaluation Results

* Scenario 1 & 2:
  + Scenario 1: Timing result in favour of the paper method
  + Scenario 2: No significant result in either methods
  + Both methods proved to be useful in finding the most suitable runs
* Scenario 3 & 4:
  + Times were more varied in these 2 scenario's compared to first 2
  + Mobile phone method proved to be 40% faster than the paper method
  + With the mobile phone, no route was chosen where it was unsuitable. But with the paper maps, this occurred for 3 out of the 10 users
* Scenario 5 & 6:
  + Scenario 6 took much longer as a task overall compared to Scenario 5
  + Both methods showed high accuracy in completion of task with no errors
* Further Findings from the Table
  + Mobile was faster for 4 out of the 6 tasks compared to the Paper Maps

Discussion

* Due to implementation, the map had to be split up into 4 quadrants on the Mobile App. Meaning users had to constantly zoom in and out and move across different quadrants. Didn't slow down the users however could have been improved
* Could implement GPS systems to allow users to provide live feedback of a run depending on the current conditions
* Further tests could have been carried out, for example using the mobile device on an actual piste with thick gloves on to help provide further insight

Conclusion

* They believed their work has been a success, due to the experiment results

Tutorial Notes

* Different methods for preference, mentioned in article
* Saturation difficult to tell on small screens
* Direct labelling was too much clutter
* Chose the line width for route suitability
* Issues when using the phone on the mountains
  + Possible connectivity issues
  + Weather, Rain or Sunshine, difficult to see
  + Must take gloves off to use mobile device
  + In cold temperature
    - Hands could be cold, making it less dextrous
    - Battery life could be impacted significantly
    - Screen could crack
* Possibility to break phone whilst skiing, if in an incident or crash.
  + Could be resolved by placing phone in inside pocket, but still a lot of effort to check phone
* Experiment Changes
  + Take gloves off during potential experiment to help get more realistic results
  + Change controllable aspects of the weather such as light or sound, perhaps perform tests within a cold place such as snow dome
  + Could have tested novice skiers would have difficulty
  + Skiers could have potentially been at the resort, hence they know the information of the resort by memory