MSc. Research Practicum: Introduction

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Key Learning Outcome

Develop software in a group, when the project specification requires you to research the subject matter

3 things to concentrate on

1 | Working as a group

You will be organized into groups, and roles

Create a protocol for working together and resolving conflict

2 | Research vs. Development

Balance your time between investigating the domain and investigating the technology

Group-based development can be slower than expected

3 | Reporting

Presentations count toward your final mark

Individual report **and** group report counts towards your final mark

The Broad Timetable

1. Groups and roles decided - 9/6/2017 (this Friday)
2. Faculty interactions will happen on Wednesdays
3. Team presentations: 14/6, 28/6, 12/7, 2/8, 23/8
4. Faculty meetings: 21/6, 5/7, 26/7, 16/8
5. Final report: 26/8

Team Presentations

1. 15 minute presentations (10 + 5 format)
2. Different team-member presents each time
3. Order of teams will be posted on Moodle

14-June	28-June	12-July	2-August	23-August
Initial Big Picture	Reqmts & Architecture	Prototype & Analytics	Current Working Prototype	Final Presentation

Faculty Meetings

1. Can book faculty-time in advance
2. TA support is available in the lab through the day
3. At least one team-member must be in lab on Wednesday
4. Have a short summary of progress ready

Report Submission

1. Two submissions: group-report and individual-report
2. Group-report deadline: 26-July
3. Individual-report deadline: 26-August
4. Format and expected content posted on Moodle

Allocation of Marks

Component	Weighting
Individual Presentation	5%
Group Presentation	5%
Group Portfolio	20%
Individual Report	70%

Elevator Pitch

- Your team pitches your final product to industry reps
- 3 - 5 minutes per team
- Does not affect your grade
- Final dates to be announced later

The Project: Dynamic Travel-Time Estimation

- Real-time ETA has been available for a while now

Not good for planning a trip tomorrow!

But not realistic expected travel-time

The Effect

DublinBus's Expected Time for 46A[1]	61 minutes
Actual (measured) Time(s) for 46A	Min - 25 minutes Max - 90 minutes

[1] https://www.dublinbus.ie/Your-Journey1/Timetables/All-Timetables/46a-2/

Your Job: Make DublinBus Great Again

1. Use open-data about
    a. Historical GPS data from DublinBus
    b. Weather
    c. Met Eireann Historical Weather
2. Create prediction models about travel time
3. Create an app (web-based) that predicts journey times
    a. For a given origin-destination
    b. At a given time of day
    c. Taking weather conditions into account

Historical GPS

1.35216E+15	15	0	150001	05/11/2012	5826	RD	0	-6.25858	53.3401	-361	15013	33210	4870	0
1.35216E+15	46	0	046A1002	05/11/2012	7267	D2	0	-6.25909	53.34543	-1101	46004	36024	794	0
1.35216E+15	14	0	140001	05/11/2012	6206	D2	0	-6.25733	53.28752	-126	14003	33325	1047	0
1.35216E+15	41	0	041B0002	05/11/2012	61	SL	0	-6.26417	53.45322	-623	41008	33631	3874	1
1.35216E+15	63	0	null	05/11/2012	1116	D2	0	-6.17105	53.2592	292	63003	33137	3283	0
1.35216E+15	39	0	039A1002	05/11/2012	3795	PO	0	-6.26245	53.34677	-532	39026	36060	1479	0
1.35216E+15	65	0	650001	05/11/2012	4004	RD	0	-6.59464	53.12978	-287	65003	38004	7283	0
1.35216E+15	40	0	040D1001	05/11/2012	2466	HN	0	-6.25885	53.3625	-488	40207	33274	52	0
1.35216E+15	4	0	null	05/11/2012	5076	HN	0	-6.26107	53.35211	0	4003	43035	4725	0
1.35216E+15	11	0	111002	05/11/2012	5241	D1	0	-6.23022	53.323	-536	11001	33462	320	0
1.35216E+15	31	0	311001	05/11/2012	2819	CF	0	-6.24168	53.36248	-386	31006	33232	613	0
1.35216E+15	27	0	270001	05/11/2012	4976	RD	0	-6.29083	53.31933	0	27011	33415	2355	1
1.35216E+15	67	0	670001	05/11/2012	893	PO	0	-6.47637	53.35533	-160	67002	40002	3892	0
1.35216E+15	79	0	790001	05/11/2012	3533	CD	0	-6.33233	53.34285	328	79002	33411	2907	0
1.35216E+15	32	0	null	05/11/2012	2757	CF	0	-6.24683	53.3546	775	32007	38083	3586	0
1.35216E+15	42	0	420002	05/11/2012	3880	CF	0	-6.17452	53.44214	0	42007	38021	3579	0
1.35216E+15	66	0	066A0001	05/11/2012	2940	PO	0	-6.37263	53.35525	-362	66001	33588	3993	0
1.35216E+15	79	0	790001	05/11/2012	3511	CD	0	-6.2966	53.34772	29	79003	33191	2907	0
1.35216E+15	140	0	null	05/11/2012	6225	HN	0	-6.26802	53.37063	0	140013	33505	274	0
1.35216E+15	332	0	033B0001	05/11/2012	503	HN	0	-6.14132	53.49016	61	332001	33501	3722	0
1.35216E+15	140	0	1400001	05/11/2012	6615	HN	0	-6.27608	53.34388	0	140010	33141	895	1
1.35216E+15	26	0	null	05/11/2012	3013	PO	0	-6.46557	53.35715	0	66008	33584	5114	0
1.35216E+15	44	0	440001	05/11/2012	5009	D2	0	-6.22056	53.26798	500	44001	33259	3467	0
1.35216E+15	37	0	null	05/11/2012	2098	PO	0	-6.27291	53.34679	0	37005	33586	7338	0
1.35216E+15	83	0	083A0001	05/11/2012	7099	HN	0	-6.27373	53.41963	0	83002	40019	324	1
1.35216E+15	272	0	027B1002	05/11/2012	374	HN	0	-6.2439	53.3985	169	272005	40013	324	0

Historical Weather Conditions

01/01/2012 05:00	0	0.1	0	8.2	0	7.1	5.8	9.2	85	998.9	2	15	2	230
01/01/2012 06:00	0	0.1	0	8.1	0	7.2	6.1	9.4	87	998.2	2	12	2	230
01/01/2012 07:00	0	0.1	0	7.2	0	6.5	5.7	9.1	90	998	2	10	2	270
01/01/2012 08:00	2	0	0	7.6	0	6.6	5.3	8.9	86	997.7	2	10	2	230
01/01/2012 09:00	2	0	0	7.4	0	6.1	4.5	8.4	81	997.5	2	11	2	230
01/01/2012 10:00	0	0	0	7.3	0	6	4.3	8.3	81	997.1	2	13	2	220
01/01/2012 11:00	0	0	0	7.6	0	6.1	4.1	8.2	79	997.1	2	15	2	230
01/01/2012 12:00	0	0	0	7.9	0	6.3	4.1	8.3	78	996.1	2	19	2	230
01/01/2012 13:00	0	0	0	7.9	0	6.2	3.9	8.1	76	995.6	2	20	2	230
01/01/2012 14:00	0	0	0	8	0	6	3.3	7.7	72	995.3	2	20	2	240
01/01/2012 15:00	2	0	0	7.3	0	5.6	3.4	7.7	76	995.7	2	19	2	240
01/01/2012 16:00	2	0	0	7.1	0	5.2	2.5	7.3	73	995.7	2	18	2	240
01/01/2012 17:00	0	0.2	0	4.6	0	3.4	1.6	6.8	81	996.6	2	19	2	250
01/01/2012 18:00	2	0	0	4.8	0	3.8	2.4	7.2	84	997.6	2	13	2	240
01/01/2012 19:00	0	0.1	0	3.2	0	2.5	1.3	6.8	88	997.5	2	17	2	240
01/01/2012 20:00	0	0	0	3.2	0	2.5	1.3	6.8	88	998.3	2	11	2	230
01/01/2012 21:00	0	0	0	3	0	2.3	1.2	6.6	88	998.7	2	8	2	200
01/01/2012 22:00	0	0	0	3	0	2.2	0.9	6.5	86	998.3	2	11	2	210
01/01/2012 23:00	0	0	0	2.9	0	1.9	0.2	6.2	83	998.1	2	14	2	220
02/01/2012 00:00	0	0	0	3.1	0	1.9	0	6	79	998.5	2	16	2	220
02/01/2012 01:00	0	0.6	0	2.5	0	1.9	0.9	6.5	89	999	2	15	2	220
02/01/2012 02:00	0	0.9	0	1.8	0	1.5	1.1	6.6	94	998.9	2	14	2	240
02/01/2012 03:00	0	0	0	1.8	0	1.2	0.1	6.2	89	999	2	15	2	230
02/01/2012 04:00	0	0.1	0	1.9	0	1.4	0.6	6.4	91	999.1	2	16	2	230
02/01/2012 05:00	0	0.2	0	1.6	0	1.2	0.6	6.3	93	999.4	2	18	2	230

Other Sources of OpenData

- Dublinked
  - DublinBus GTFS Feed
  - Traffic Journey times
  - Dublin Traffic
- OpenWeather API / DarkSky / AccuWeather
- Any other you can get hold of?

Expectations from teams

- Good software engineering practices
- Research into possible analytics
- Innovation [beyond the project spec]

Technical Challenges

- Data parsing, transformation, display
  - Different sources will have different formats, nomenclatures, granularity, …
  - E.g. Understanding DublinBus's GPS data (which is in a big csv) will be challenging
    - One csv for each day
  - Multiple formats: csv, json, etc.
- Analytics
  - Choosing the right model
  - Testing your predictions
- Integration with other technologies

Career Development

- Talks by Edel Caraway
  - Lunch-time talks
  - Most wednesdays
  - Schedule will be put up on Moodle

That’s all, folks!